SISTEMAS INFORMÁTICOS 2014/2015

FACULTAD DE INFORMÁTICA

UNIVERSIDAD COMPLUTENSE DE MADRID

ACIDE Debugging

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ÍNDICE DE CONTENIDOS

2. RESUMEN DEL PROYECTO

*Durante el presente curso académico, el equipo formado por Sergio Domínguez Fuentes se ha encargado del desarrollo de "**ACIDE: A Configurable IDE**" para la asignatura de Sistemas Informáticos.*

ACIDE es un entorno de desarrollo integrado que puede ser fácilmente configurado para casi cualquier intérprete, compilador o sistema de bases de datos.

Este proyecto no ha empezado este curso, si no que ha sido desarrollado en cursos anteriores por diferentes grupos de alumnos en la asignatura Sistemas Informáticos:

- *El primer año en el que se llevó a cabo fue en el curso académico 2006-2007 por Diego Cardiel Freire, Juan José Ortiz Sánchez y Delfín Rupérez Cañas.*
- *Durante el curso académico 2007-2008 el desarrollo fue continuado por Miguel Martín Lázaro.*
- *La siguiente iteración en el desarrollo de ACIDE fue en el curso 2010-2011 por Javier Salcedo Gómez.*
- *Durante el curso académico 2012-2013 el desarrollo de ACIDE siguió en manos de Pablo Gutiérrez García-Pardo, Elena Tejeiro Pérez de Ágreda y Andrés Vicente del Cura.*
- *Y en el curso académico 2013-2014 el desarrollo se realizó por Juan Jesús Marqués Ortiz, Fernando Ordás Lorente y Semíramis Gutiérrez Quintana, quienes dejaron ACIDE en el estado de desarrollo en el que nuestro grupo se lo encontró.*

Este proyecto fue dirigido siempre por Fernando Sáenz Pérez.

El objetivo al iniciar esta nueva etapa en ACIDE que comprende el presente curso académico era mejorar la aplicación corrigiendo errores, mejorando funcionalidades y añadiendo nuevas características.

*Todos los detalles sobre el desarrollo en anteriores cursos académicos pueden encontrarse en las memorias realizadas por los grupos antes mencionados, cuyas memorias se encuentran listadas en la sección **[1]**, **[2]**, **[3]**, **[4]** y **[5]** del capítulo Referencias.*

La versión que heredamos del proyecto anterior (versión 0.16) tenía un código fuente estandarizado y un comportamiento estable en cuanto a la gestión de proyectos, creación y edición de ficheros de texto en diferentes lenguajes de programación, conexión tanto con ODBC como con ***DES (Datalog Educational System) [6].***

DES *es una implementación basada en Prolog de un Sistema de bases de datos deductivas.*

Durante el presente curso académico hemos añadido funcionalidades a las ya existentes como las ya comentadas antes y hemos desarrollado algunas nuevas o pendientes de cursos anteriores.

3. ABSTRACT

*During the current academic year, the working group formed by Sergio Dominguez Fuentes has taken the duty to develop "**ACIDE: A Configurable IDE**" as project of "Computing Systems".*

ACIDE is an integrated development environment easily configurable for almost all the interpreters, compilers or database systems.

This development is based in previous version of ACIDE; these versions were made by some working groups as projects of "Computing Systems":

- *The first time ACIDE was developed was during the academic year 2006-2007 by Diego Cardiel Freire, Juan José Ortiz Sánchez and Delfín Rupérez Cañas.*
- *After that, during the academic year 2007-2008 the development Miguel Martín Lázaro continued with ACIDE.*
- *The next phase was made by Javier Salcedo Gómez during the 2010-2011 academic year.*
- *During the academic year 2012-2013, the development was implemented by Pablo Gutiérrez García-Pardo, Elena Tejeiro Pérez de Ágreda and Andrés Vicente del Cura*
- *The last iteration was implemented by Juan Jesús Marqués Ortiz, Fernando Ordás Lorente y Semíramis Gutiérrez Quintana during the 2013-2014 academic year.*

This project was always managed by Fernando Sáenz Pérez.

The main goal in this new period was to improve the application by adding new features and repairing or modifying old features.

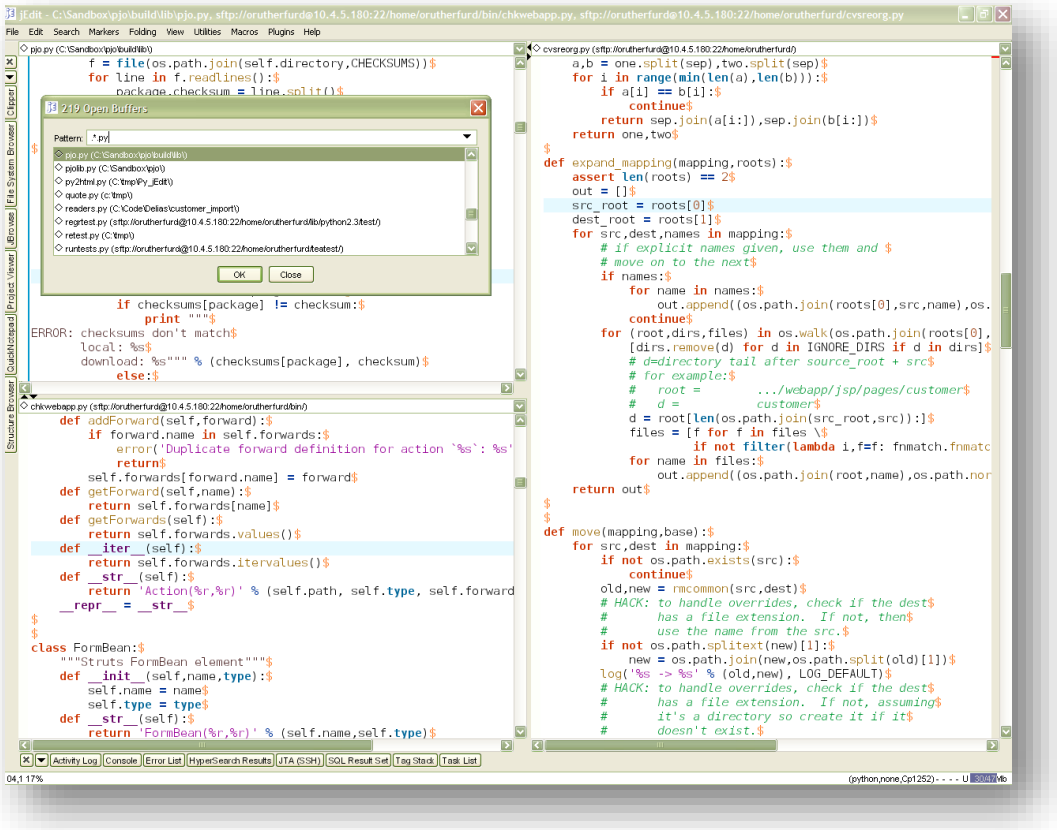
*Details about the development in previous academic years can be found in the reports made by the aforementioned working groups. These reports are listed in section **[1]**, **[2]**, **[3]**, **[4]** and **[5]** in the References chapter.*

*We started from the version 0.16, it had a standardized source code and a stable performance in terms of projects management, creating and editing text files in different programming languages and connection with ODBC and **DES (Datalog Educational System) [6].***

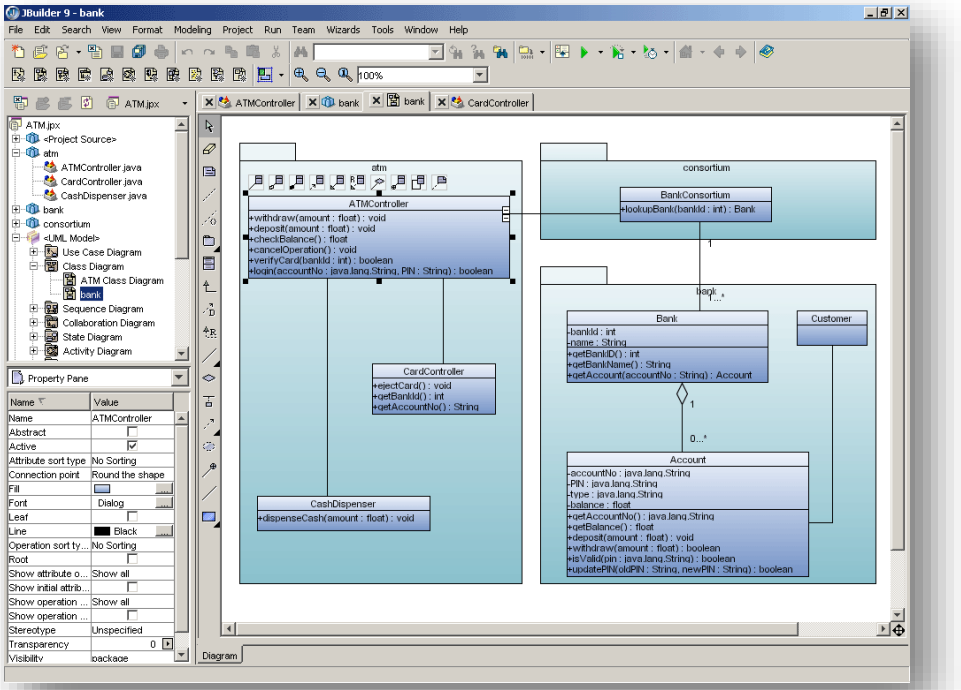
4. ESTADO DEL ARTE

Para entender la evolución de ACIDE, primero vamos a mostrar un resumen sobre el estado del arte en las publicaciones **[1]**, **[2]** y **[3]**, este resumen fue realizado en la publicación **[4]** y muestra con detalle el estado de arte de ACIDE durante los tres primeros cursos que estuvo en desarrollo. Una vez mostrado este resumen, se describe el estado del arte en **[4]** y se finaliza el capítulo listando las referencias que se han seguido durante el presente curso académico.

En **[1]** comenzó el desarrollo del proyecto *ACIDE – A Configurable IDE*, en el cual se buscaba crear un IDE configurable para distintos lenguajes de programación y lo bastante sencillo como para no asustar al usuario con demasiadas opciones y complejidad. Entre los editores de texto consultados, se encuentran **Crimson Editor [7]** y **JEdit [8]**. Ambos son editores de texto sencillos que permiten el resaltado de palabras reservadas, seleccionadas de varios listados procedentes de diferentes lenguajes. Además, JEdit permite configurar los menús, una idea muy atractiva para el tipo de IDE que se perseguía desarrollar.



Entre los entornos de desarrollo integrados, se pueden distinguir dos grandes grupos, los orientados a un lenguaje de programación en concreto y los que tienen diferentes configuraciones para distintos lenguajes. La principal ventaja del primer grupo es que permiten mayor especialización y poseen herramientas más específicas. En esta primera opción se destacaron **JBuilder [9], JCreator [10]** y **C++ Builder [11]**. Los dos primeros están especializados en programación en *Java*, siendo JBuilder más completo que JCreator, ya que ofrece la posibilidad de programar los botones del interfaz, posee un interfaz gráfico para la creación de elementos Swing y ofrece depuración. C++ Builder es de la misma casa que este último, ofrece funcionalidades similares pero para el lenguaje C++.

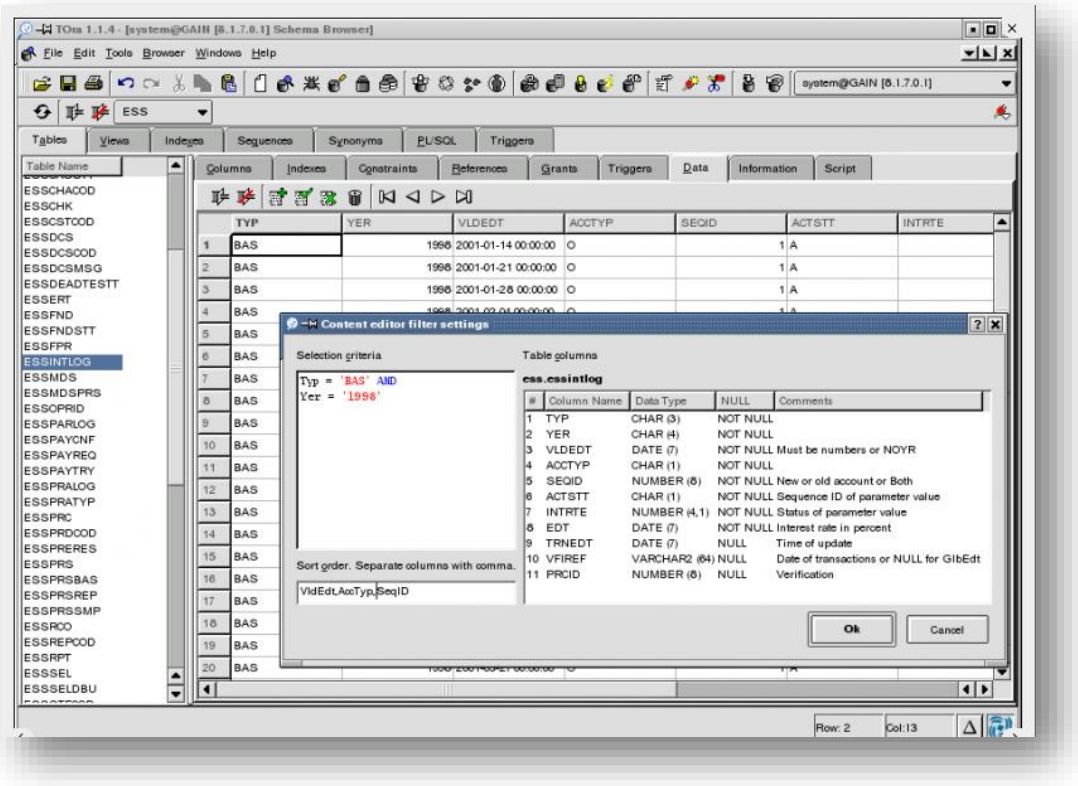


En el grupo de programas no orientados exclusivamente a un lenguaje, se encuentra el gran conocido **Eclipse [12]**. Posee gran cantidad de opciones de configuración para muchos lenguajes. Su gran inconveniente es que su configuración requiere una larga descarga de plugins, y solo para los lenguajes que sus desarrolladores nos ofrezcan, no se puede configurar a mano. Por otra parte, a veces se hace demasiado complicado para lo que se buscaba en *ACIDE – A Configurable IDE.* A pesar de las desventajas enumeradas, no deja de ser un programa muy completo y recomendable a la hora de tomarlo como referencia.

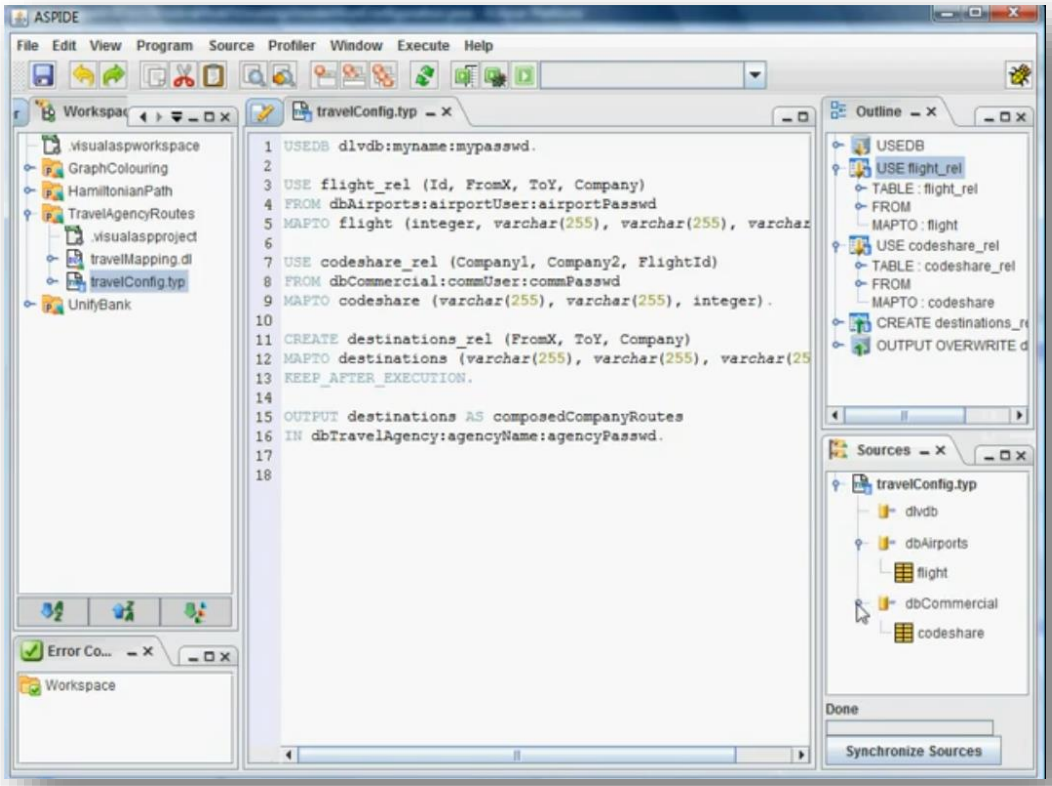
En el documento **[2]**, el único programa que se menciona es **Visual Studio Shell [13]**. Se trata del conocido Visual Studio de Microsoft, pero reducido a su estructura básica, de tal forma que el usuario pueda adaptarlo para programar con un lenguaje propio y crear herramientas personalizadas.

En cuanto al estado del arte en **[3],** se menciona que para esa versión de *ACIDE – A Configurable IDE* se han seguido tomando como referencia los programas **JEdit [8], Crimson Editor [7]** y **Eclipse [12]**. Además se han añadido como referencia **WinEdt [14]** y **NetBeans [15].**

En **[4]** la prioridad era conseguir conectar la consola con ODBC y DES, para ello se tomó como referencia los entornos gráficos de *Sistemas Gestores de Bases de Datos* de los propios fabricantes **MS Access [16]**, **Oracle [17]**, **Postgres [18]** y la herramienta **TOra [19]** para la adición de nuevas propiedades y funcionalidades en la mejora del proyecto.



En **[4]** también se incluye la aparición de un nuevo software con características similares a *ACIDE* llamado **ASPIDE [20]** que también se tomó como referencia.



En **[5]** se siguió trabajando en aumentar la funcionalidad del proyecto partiendo del estado **[4]** aprovechando su conexión con el sistema **DES [6]** y el sistema ODBC creando nuevos paneles que interactúan con la consola y agregando nuevas funciones en los paneles existentes. Se siguieron utilizando las referencias antes mencionadas, destacando **Crimson Editor [7]** del cual se han sacado funcionalidades para ACIDE útiles para el usuario.

En esta última versión del proyecto se ha continuado el afán por aumentar la funcionalidad del proyecto, otorgándole la localización al francés, creando un nuevo panel que sirva en el futuro para la depuración de código y agregando nuevas funciones y utilidades a los paneles ya existentes de forma que resulte más sencillo e intuitivo el manejo de la aplicación. Se han seguido tomando como referencia los programas **Eclipse [12]**, **Notepad++ [22]**, **Dropbox [21]** y **GitiHub [24]**.

5. ESTÁNDARES

Cuando empezamos el proyecto, nos dimos cuenta que en los cursos anteriores, los grupos que trabajaron en este proyecto habían invertido mucho tiempo y esfuerzo en la estandarización del código fuente, los comentarios y la documentación. La estandarización es muy importante en este proyecto por la naturaleza de código abierto del mismo y ha sido una de nuestras prioridades a la hora de desarrollar código, comentarlo y escribir la documentación. Esta prioridad ha venido impuesta como un deseo del propio grupo de poder ofrecer un código lo más limpio y entendible posible, tanto a futuros grupos de la asignatura Sistemas Informáticos, como a toda aquella persona interesada en consultar el código que mueve a ACIDE.

A continuación se explican los estándares seguidos, puede consultarse más información sobre los estándares seguidos en las memorias correspondientes a ACIDE de años anteriores **[1]**, **[2]**, **[3]**, **[4]** y **[5]**.

5.1. CONTROL DE VERSIONES

Se ha llevado a cabo el control de versiones utilizando el cliente de versiones **GitHub [24]**.

Cada semana se ha entregado una nueva versión de la aplicación al director Fernando Sáenz Pérez que consistía en un archivo ZIP y el documento *TODO* de tareas a través de un enlace a una carpeta de entregas localizada en la aplicación de almacenamiento en la nube **Dropbox [21].** Dentro del archivo ZIP se encontraba el ejecutable del proyecto. Cada archivo semanal seguía el siguiente convenio de nomenclatura: **"trunk_VersionApp_VersionEntrega_AAAAMMDD.zip"** expresando el año (AAAA), mes (MM) y día (DD) en forma numérica. De esta forma podíamos ir almacenando todo el conjunto de versiones que se han ido entregando, y examinar la evolución temporal del proyecto sin lugar a la confusión.

5.2. DOCUMENTACIÓN

En la comunicación entre alumno y profesor durante la realización del proyecto, se ha llevado a cabo el seguimiento del documento de tareas escritos periódicamente y llamado **"TODO_ACIDE.docx"**. Este documento de tareas se enviaba semanalmente junto a cada entregable, para su corrección y actualización, siendo entregada la nueva versión del documento a los alumnos, con las tareas a corregir y realizar durante la siguiente semana.

En cuanto al contenido, este documento se ha dividido en tres secciones principales: *Introducción*, *Tareas a Completar y Tareas Completadas.* Estas categorías se dividen a su vez en secciones basándose en las diversas funcionalidades de la aplicación. Se establecen dos niveles de prioridad: *tareas urgentes (en negrita)* y *futuras funcionalidades.*

Se ha creado una leyenda para mejorar la comprensión de estos documentos, explicando el significado de cada color de fuente utilizado en la redacción de las tareas:

- **Verde**: Implementación completa y funcionamiento correcto.
- **Amarillo**: Implementación en curso de desarrollo.
- **Rojo**: Implementación no conseguida.
- **Negro**: Comentarios del profesor.

Los estándares aplicados en estos documentos de tareas han sido los mismos que en cursos anteriores y son los siguientes:

- El estilo de texto *Normal* en el documento está compuesto por fuente Arial, con tamaño 12pt, párrafo justificado, sangría de 0,5 cm en la primera línea, color negro, interlineado de 1,5pt y espaciado anterior y posterior al párrafo de 6pt.
- El estilo de *Título 1* está compuesto por fuente Calibri, con tamaño 26pt, párrafo justificado, color "Azul Oscuro, Texto 2", estilo *Versales*, espaciado anterior 24pt y posterior 15pt al párrafo.

- El estilo de *Título 2* está compuesto por fuente Calibri, con tamaño 16pt, párrafo justificado, sangría francesa de 0,63 cm, color "Azul Oscuro, Texto 2", estilo negrita y *Versales*, espaciado anterior 24pt y posterior 10pt al párrafo.
- El formato del pie de página está compuesto por fuente Arial, tamaño 12pt, color negro. El pie de página contiene el texto "Sistemas Informáticos 2012-2013" y a la derecha el número de página en estilo negrita. Una línea de color azul separa el pie de página del resto de texto.
- Las listas de enumeraciones se han realizado mediante la herramienta para enumeraciones de Microsoft Word 2010.

El presente documento y el manual de usuario han seguido los mismos estándares:

- El estilo de texto *Normal* en el documento está compuesto por fuente Cambria, con tamaño 12pt, párrafo justificado, sangría de 0,5 cm en la primera línea, color negro, interlineado de 1,5pt y espaciado anterior y posterior al párrafo de 6pt.
- El estilo de *Título 1* está compuesto por fuente Cambria, con tamaño 26pt, párrafo justificado, color "Azul Oscuro, Texto 2", estilo *Versales*, espaciado anterior 24pt y posterior 15pt al párrafo.
- El estilo de *Título 2* está compuesto por fuente Cambria, con tamaño 16pt, párrafo justificado, sangría francesa de 0,63 cm, color "Azul Oscuro, Texto 2", estilo negrita y *Versales*, espaciado anterior 24pt y posterior 10pt al párrafo.
- El estilo de *Título 3* está compuesto por fuente Cambria, con tamaño 14pt, párrafo justificado, sangría francesa de 0,63 cm, color "Azul Oscuro, Texto 2", estilo negrita y *Versales*, espaciado anterior 10pt.
- El formato para escribir el código fuente en este documento está compuesto por la fuente Courier New, con tamaño 11pt, alineación a la izquierda y borde negro.
- El formato del pie de página está compuesto por fuente Cambria, tamaño 12pt, color negro. El pie de página contiene el texto "Sistemas Informáticos

2012-2013" y a la derecha el número de página en estilo negrita. Una línea de color azul separa el pie de página del resto de texto.

- El encabezado contiene las imágenes del logo de la aplicación, el símbolo de la Facultad de Informática y el escudo de la Universidad Complutense de Madrid.
- Las listas de enumeraciones se han realizado mediante la herramienta para enumeraciones de Microsoft Word 2010.

5.3. CÓDIGO FUENTE

Como se ha comentado anteriormente, se ha hecho un gran esfuerzo por mantener el código en forma estandarizada. Se han seguido las normas establecidas en cursos anteriores y que pasamos a listar a continuación:

- Todo el código está en **inglés**.
- En cada una de las clases del código se encuentra el código de licencia pública **GPLv3**, al comienzo de las mismas:

```
/*
*    ACIDE - A Configurable IDE
* Official web site: http://acide.sourceforge.net
*
*    Copyright © 2007-2014
*    Authors:
*         - Fernando Sáenz Pérez (Team Director).
*         - Version from 0.1 to 0.6:
*              - Diego Cardiel Freire.
*              - Juan José Ortiz Sánchez.
*              - Delfín Rupérez Cañas.
*         - Version 0.7:
*              - Miguel Martín Lázaro.
*         - Version 0.8:
*              - Javier Salcedo Gómez.
*         - Version from 0.9 to 0.11:
*              - Pablo Gutiérrez García-Pardo.
*              - Elena Tejeiro Pérez de Ágreda.
*              - Andrés Vicente del Cura.
*         - Version from 0.12 to 0.16
*              - Semíramis Gutiérrez Quintana
*              - Juan Jesús Marqués Ortiz
*              - Fernando Ordás Lorente
*          - Version 0.17
*              - Sergio Domínguez Fuentes
```

```
*
*    This program is free software: you can redistribute it and/or
* modify it under the terms of the GNU General Public License as
* published by the Free Software Foundation, either version 3 of
* the License, or (at your option) any later version.
*
*    This program is distributed in the hope that it will be
* useful, but WITHOUT ANY WARRANTY; without even the implied
* warranty of MERCHANBILITY or FITNESS FOR A PARTICULAR PURPOSE.
* See the GNU General Public License for more details.
*
*    You should have received a copy of the GNU General Public
* License along with this program. If not, see
* http://www.gnu.org/licenses/
*>
```

- Comentarios **Javadoc,** simples y multilínea. Se ha procurado introducir comentarios en cada una de las líneas de código para hacer más entendible y amigable en su distribución el código.

```
// Updates the log
AcideLog.getLog().info(AcideLanguageManager.getInstance().
getLabels().getString("s555"));
//Loads the ACIDE - A Configurable IDE workbench configuration
AcideWorkbenchConfiguration.getInstance().load();
```

- Por cada clase Java en el código para los comentarios **Javadoc** se sigue el siguiente formato:

```
/**
*    Descripción de la clase.
*
*    @version 0.11
* (@see <NombreDeClase/NombreDeInterfaz>)
*/
```

- Las variables de cada clase van precedidas por "_":

```
private AcideFileMenu _fileMenu;
private boolean _fileInserted;
```

- En todas las clases el nombre de la clase empieza por **"Acide"** seguido por las palabras que definen la clase, empezando cada palabra por mayúscula, siguiendo el estándar de Java:

```
public Class AcideMenuBar extends JMenuBar {…}
```

- En los nombres de los métodos, la primera palabra del nombre empieza por minúscula y las palabras que siguen por mayúscula:

```
public void setTextOfMenuComponents() {…}
```

- En las constantes de las clases, todo el nombre de la constante va en mayúsculas, separando cada palabra con"_".

```
public static final String DEFAULT_PATH = "./configuration/menu";
```

- En la configuración de los menús, las constantes que expresan los nombres y los nombres de los iconos de cada opción del menú terminan con **"NAME"** e **"IMAGE"** respectivamente:

```
public static final String COMPILER_NAME;
public static final ImageIcon COMPILER_IMAGE;
```

- En clases que se refieren a ventanas de configuración, los nombres de las variables terminan con el tipo de componente al que hacen referencia:

```
private JTabbedPane _tabbedPane;
private AcideFileMenuNewPanel _fileMenuPanel;
private JButton _acceptButton;
```

- En todas las clases que corresponden a ventanas de configuración aparecen los siguientes métodos:

```
//Builds the ACIDE - A Configurable IDE configuration window
//components
private void initComponents() {…}
//Adds the components to the ACIDE - A Configurable IDE to the
//configuration window
private void addComponents() {…}
//Sets the ACIDE - A Configurable IDE configuration window
//configuration
private void setWindowConfiguration() {…}
//Sets the listeners of the configuration window components.
private void setListeners() {…}
//Closes the window
private void closeWindow() {…}
```

- En todas las clases que corresponden a la barra de menús y menús contextuales aparecen obligatoriamente estos métodos:

```
//Builds the ACIDE - A Configurable IDE configuration window
//components
private void buildComponents() {…}
//Adds the components to the ACIDE - A Configurable IDE to the
//configuration window
private void addComponents() {…}
//Sets the text of the ACIDE - A Configurable IDE class components
//with the labels in the selected language to display
private void setTextOfMenuComponents() {…}
//Updates the ACIDE - A Configurable IDE class components
//visibility with the menu configuration
private void updateComponentsVisibility() {…}
//Sets the listeners of the configuration window components.
private void setListeners() {…}
```

6. GESTIÓN DE LA CONFIGURACIÓN

Todos los archivos del proyecto, tanto los archivos de documentación como los archivos de código son objeto de control de la gestión de la configuración. Se ha seguido con la configuración de la gestión descrita en las memorias **[1]**, **[2]**, **[3]**, **[4]** y **[5]**.

Al elegir los nombres de documentos y de clases en el código fuente se utilizarán siempre nombres que sean descriptivos de la información que contienen. Como se ha comentado en la sección de estándares, para cada clase en el código fuente se indica la versión a la que pertenece en el comentario previo al inicio de la clase. El control de versiones en el código fuente se hace de forma automática gracias al uso del cliente **GitHub [24]**.

Por motivos de seguridad, todas las entregas debían de permitir el funcionamiento de la aplicación y se han guardado como backup en la herramienta **Dropbox [21]**. De esta manera en caso de fallo de los equipos, poseíamos copias de seguridad de versiones anteriores a parte del control de versiones ya realizado por GitHub.

Para la documentación, se guardaba la documentación de manera local en Dropbox de modo que estuviera segura ante cualquier tipo de incidente. Los documentos de tareas generados semanalmente, eran guardados y actualizados al finalizar una tarea.

Hemos utilizado el siguiente software para la realización del proyecto:

- **Eclipse SDK versión 4.4.2 [12]** para el desarrollo del código fuente en lenguaje *Java*.
- **Microsoft Office 2010** para la documentación semanal y final del proyecto.
- **WinRar[25]** para la generación de los archivos comprimidos.
- **Notepad++ [22]** para la creación y edición de los archivos.
- **Dropbox [21]** para guardar documentos generados durante el curso.
- **GitHub[24]** como repositorio del código fuente y control de versiones.

7. GESTIÓN DE REQUISITOS

Al principio se ha respetado la gestión de requisitos consultada en **[5]**, sin embargo, ésta se ha ido modificando conforme el proyecto se iba desarrollando y surgían nuevas posibilidades.

Tras la primera toma de contacto, antes del comienzo del desarrollo del proyecto, los requisitos fundamentales consistían en eliminar los errores existentes y aumentar las funcionalidades requeridas.

Como se menciona en **[3], [4]** y **[5]**, la estandarización y optimización del código fuente se ha seguido cuidando. Al ser una aplicación de libre distribución, es fundamental que el código publicado sea legible por terceros de manera que puedan contribuir al desarrollo del mismo.

7.1. REQUISITOS GENERALES

- En la aplicación se deben usar los nombres e identificadores exactamente como se indica en este capítulo de requisitos. En particular se debe prestar especial atención al uso de mayúsculas y minúsculas.
- Todos los cuadros de diálogo con botón *Cancelar* (*Cancel*) deben aceptar para la misma función la pulsación de la tecla *Esc.*
- Al cerrar un cuadro de diálogo con el botón rojo del aspa se debe aplicar la misma función del botón *Cancelar* (*Cancel*) o la función predeterminada para cerrar el cuadro si no lo hubiere.
- Todos los cuadros de diálogo deben aceptar la pulsación de la tecla *ENTER* para realizar la acción predeterminada. Por ejemplo, la pulsación del botón *Aceptar* (*OK*).
- Todos los rótulos deben estar gestionados por la localización (dependiendo del idioma seleccionado en la aplicación se mostrarán los rótulos en ese idioma). En este documento solo se muestran los idiomas español e inglés, pero puede haber más.
- La aplicación debe ser ejecutable en distintas plataformas: *Windows, Linux, Mac OS*.

- Todos los identificadores *SQL* que se envíen a *DES* deben aparecer encerrados entre delimitadores.
- El editor de texto que corresponda a la *Vista Diseño* de una vista debe estar sincronizado con la selección en el árbol del *Explorador de bases de datos*. Es decir, se debe seleccionar el nodo del árbol que corresponda cuando el editor tenga el foco (y deseleccionar el nodo del *Explorador de proyecto,* sin olvidar que se debe volver a seleccionar adecuadamente cuando se lleve el foco a otro editor de archivo).
- El cierre de cualquier ventana se podrá realizar con la combinación de teclas de acceso directo *Alt+F4.*
- Las ventanas deben ser redimensionables.
- Todos los menús y barras de comando deben ser parametrizables por archivo de configuración.

7.2. DEPURACIÓN

En este apartado se va a explicar detalladamente el documento "DES-Debug". Este documento describe los requisitos de la aplicación DES-ACIDE integrada en ACIDE: A Configurable IDE referentes a la depuración SQL y Datalog y que ha centrado gran parte de los esfuerzos de desarrollo durante el curso y por la que nuestro proyecto lleva el nombre Debugging ACIDE.

A continuación se describirán los requisitos que se deben cumplir en el desarrollo de la aplicación de depuración declarativa integrada en ACIDE.

7.2.1. COMPONENTES DE LA APLICACIÓN

La aplicación tiene dos partes principales:

- Traza de consultas Datalog y vistas SQL
- Depuración de consultas Datalog y vistas SQL

La traza permite, a partir de una consulta Datalog o vista SQL, inspeccionar su sub-PDG (grafo de dependencias restringido transitivamente a las de un nodo en

particular) examinando sus nodos. Para cada nodo se debe poder ver las tuplas calculadas para él (en una ventana Data View) e iluminar las filas que contengan las reglas o consultas de su definición. Este contenido puede estar repartido entre distintos archivos de texto y de la base de datos asertada.

7.2.2. INICIO DE LA APLICACIÓN

Para acceder a la aplicación de depuración en ACIDE-DES, se deben añadir los siguientes elementos nuevos al menú Ver:

- Base de datos asertada
- Traza
  - Datalog
  - SQL
- Depuración
  - Datalog
  - SQL

7.2.3. PANEL BASE DE DATOS ASERTADA

Al seleccionar "Ver" ("View") -> "Base de datos asertada" ("Asserted Database") se debe mostrar un panel con las reglas y hechos de la base de datos asertada (reglas introducidas por consola en lugar de procesadas o consultadas de archivo) ordenados por predicado (nombre/aridad: las reglas de los predicados de igual nombre pero distinta aridad se muestran de menor a mayor aridad) y con una barra inferior con distintos controles.

Al abrir este panel se deben rellenar automáticamente sus contenidos como se indica en el siguiente apartado.

7.2.3.1. BARRA INFERIOR

La barra inferior contiene los siguientes controles y etiquetas:

"R"<<Button>> "C"<<Button>> Filtro<<CheckBox>> Núm.<<Label>>

- Botón “R”(“Refresh”):
    - Uso: permite actualizar los contenidos del panel de la base de datos asertada.
    - Pulsación: Actualización del panel de la base de datos asertada.
    - Atajo: F5.
    - Comandos TAPI:
        - Para obtener los predicados: ***/tapi /pdg***
        - Para obtener las reglas de la definición de cada predicado: ***/tapi /listing_asserted Name/Arity***. Se debe emitir este comando por cada uno de los nodos del PDG, anotando internamente las reglas del panel que correspondan a cada predicado.
- Botón “C” (“Clear”):
    - Uso: permite quitar el resalte.
    - Pulsación: Quitar resalte.
- La casilla de verificación Filtro, si está activada, muestra solo las reglas del nodo seleccionado. Si está desactivada, muestra todas las reglas de la base de datos asertada.
- Etiqueta “Núm”:
    - Uso: Muestra el número de reglas observando el número.

7.2.3.2. PANEL

El panel muestra cada regla asertada, separándolas entre sí visualmente. Se puede resaltar un conjunto de líneas (consecutivas) como resultado de una interacción con el panel de depuración o de traza.

7.2.4. PANEL TRAZA DATALOG

Al seleccionar “Vista” (“View”) -> “Traza” (“Trace”) -> “Datalog” se muestra el panel “Traza Datalog” (“Trace Datalog”), que mostrará el sub-PDG restringido a una consulta, y una barra inferior con distintos controles. El panel no muestra nada hasta que no se haya introducido la consulta.

7.2.4.1. BARRA INFERIOR

La barra inferior contiene los siguientes controles y etiquetas, además de los que ya contenía la barra inferior del panel PDG:

"Consulta Datalog:" ("Datalog Query:") <<TextBox>> "R"<<Button>>
"<-"<<Button>> "->"<<Button>> "Mostrar reglas" ("Show rules")<<CheckBox>>

- El cuadro de texto "Consulta Datalog:" admite escribir una consulta Datalog en una sola línea sobre la que se efectuará la traza.
- Intro: Reinicio de la traza. Se selecciona automáticamente el primer nodo en el recorrido.
- Comando TAPI: ***/tapi /trace_datalog Query***, donde "Query" es el valor introducido en el cuadro de texto. Devuelve el recorrido de nodos.
- El botón "R" permite reiniciar la traza (similar a un botón "Actualizar"). Este comportamiento reemplaza el comportamiento del botón "R" del panel PDG del que hereda.
- Comando TAPI: ***/tapi /trace_datalog Query***, donde "*Query*" es el valor introducido en el cuadro de texto.
- El botón flecha a la izquierda "<-" permite seleccionar el nodo anterior del sub-PDG en el orden de recorrido que devuelve el comando ***/tapi /trace_datalog Query***. Si se pulsa sobre el nodo que es el primero en este orden, se seleccionará el último.
- El botón flecha a la derecha "->" hace lo propio con el nodo posterior. Si se pulsa sobre el nodo que es el último en el orden, se seleccionará el primero.
- La casilla de verificación "Mostrar reglas", si está activada, provoca que se resalte automáticamente las reglas en los editores y el panel de la base de datos asertada.

7.2.4.2. PANEL DE TRAZA

El panel de traza es similar al panel del PDG al que se le añaden nuevas funcionalidades:

- Selección de un nodo (Clic sobre el nodo): seleccionar las reglas de su predicado, que pueden estar repartidas entre un editor de archivo y el panel "Asserted Database". El comando ***/tapi /list_sources Name/Arity*** lista los archivos y números de línea para las reglas consultadas, y el momento de las asertadas. Para saber en qué editor y líneas se encuentran las consultadas para seleccionarlas se hace mediante este comando. Para saber las reglas a seleccionar en el panel de la base de datos asertada se hace uso de la información que se obtuvo para construir sus contenidos.
- Doble clic sobre un nodo: abrir el "Data View" del nodo. El comando ***/tapi /list_et Name/Arity*** devuelve los contenidos de la tabla de extensión para las respuestas calculadas para el nodo Name/Arity.

7.2.5. PANEL TRAZA SQL

Es equivalente al panel "Traza Datalog". Al igual que este, no se rellena hasta que no se elija la vista a trazar. Como diferencia, en lugar de seleccionar las reglas que definen un predicado, se selecciona la definición de la vista (consulta SQL de la instrucción de creación de vista).

7.2.6. PANEL DEPURADOR SQL

Es equivalente al panel "Traza SQL" y al igual que los anteriores, no se rellena hasta que no se elija la vista a trazar. Lo que caracteriza a este panel, es que permite abrir un menú desplegable en cada nodo para poder depurar de una forma más eficiente las vistas, pudiendo modificar el color de los nodos entre otras opciones. El objetivo final de este panel será identificar los nodos en error y marcarlos en rojo de forma automática, para así identificarlos directamente.

Hasta el momento, es el propio usuario quien puede marcar los nodos como "válido", "no válido" o "desconocido".

8. PLANIFICACIÓN

La planificación se ha llevado a cabo en iteraciones semanales. Un día a la semana me he reunido con el director Fernando Sáenz Pérez. Durante estas reuniones se han evaluado los progresos y el trabajo realizado durante esa semana y se han propuesto tareas y objetivos para la semana siguiente.

Para llevar a cabo esta planificación, en cada reunión disponíamos de un documento de tareas, donde se indicaban las tareas realizadas, las tareas que habían supuesto alguna dificultad, o las dudas relativas a una tarea en concreto y la aplicación con el trabajo de esa semana. En la reunión se repasaba el documento, realizando pruebas unitarias sobre las tareas realizadas y resolviendo las dudas que habían surgido durante la semana. Una vez se había revisado el documento y según el resultado de la revisión, se planificaban las tareas de la semana siguiente, intentando realizar las planificaciones en función de la dificultad y la prioridad.

Durante el ciclo de vida del desarrollo se pueden observar las diferentes modificaciones y mejoras recogidas todas ellas en un único hito importante que corresponde a una nueva publicación de la aplicación.

8.1. RELEASE FINAL

El desarrollo de esta release queda delimitado entre el **inicio del proyecto** y **el final del curso académico**, correspondiendo con la entrega final de un IDE estable y distribuible.

Durante todo este periodo, inicialmente la prioridad fue familiarizarse con la aplicación, configurar el entorno de trabajo y buscar y resolver posibles bugs que pudieran haber sido arrastrados de años anteriores y que no hubieran sido detectados antes.

Una vez que tuve el entorno de trabajo preparado y configurado se dispuso a la resolución de las primeras tareas.

Posteriormente, una vez la aplicación ya comenzaba a ser más conocida y tras realizar tareas como la localización al francés, la modificación que permitía la

apertura de múltiples documentos nuevos simultáneamente o la modificación de la barra inferior de la aplicación para permitir su copiado, se comenzó con las modificaciones de funcionalidad más específicos y la corrección de bugs detectados.

Una de las mejoras introducidas más importantes fue la creación de la nueva pestaña de depuración SQL en el panel de Depuración para permitir la interacción directa de la vista con el usuario ayudando a éste último a depurar posibles errores en la vista ayudado de un código de colores individual para cada nodo.

Con la finalización de esta iteración se publicó la **versión 0.17** de la aplicación, con las nuevas funcionalidades sobre las que se había trabajado operativas.

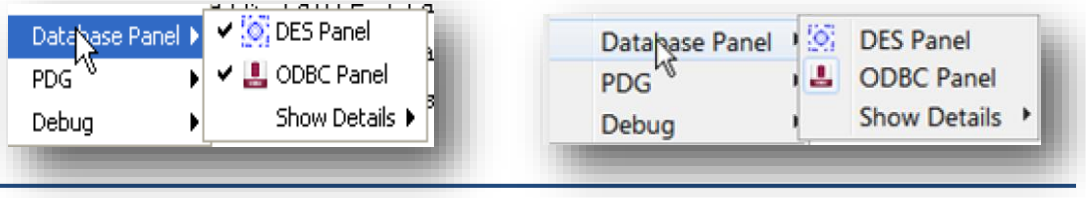
9. TAREAS REALIZADAS

A continuación se describen en detalle las tareas realizadas separadas en los diferentes módulos de la aplicación:

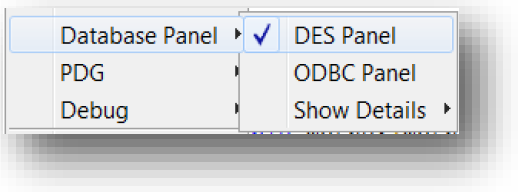
9.1. TAREAS GENERALES

En esta sección se recogen las tareas que por su naturaleza no pueden englobarse en los puntos específicos de cada panel y que afectan de una forma u otra al conjunto de la aplicación:

- Localización al Francés. Dado la gran utilización de esta aplicación en diferentes países, se ha realizado la localización de toda la aplicación al francés, permitiendo ya trabajar con la aplicación en tres idiomas y facilitando su manejo a cada vez un mayor número de usuarios.
- Barra de estado copiable. A fin de permitir copiar la ruta y/o el nombre del archivo actual de trabajo (pero sin permitir su edición), se modificaron las características de la barra de estado inferior dónde se indican dichos datos.
- Cambio de ruta de la apertura de archivos. Para facilitar hallar los archivos a abrir, si no hay un proyecto cargado y se intenta abrir un archivo, el directorio para seleccionarlo se ha cambiado por el de inicio de la aplicación ACIDE, en lugar de Mis Documentos como estaba anteriormente.
- Mantenimiento de la estandarización, como se ha indicado en la sección Estándares, el proyecto fue heredado con una serie de estándares que se han seguido usando, por lo que ha sido una tarea constante la continuación de los estándares recibidos, para poder tener tanto un código como una documentación lo más homogénea y limpia.
- Compatibilidad Windows 7 – Windows XP. Con relación al menú desplegable "Configuration>Database Panel" se encontró una incompatibilidad entre las plataformas XP (izqda.) y 7 (dcha.) de Windows:



Dicha incompatibilidad, como se muestra en la imagen, no permitía saber el panel seleccionado ya que en Windows 7 los tic quedaban ocultos tras la imagen del logo. Otro de los errores detectados, fue que cuando seleccionábamos ODBC Panel, no permitía deseleccionarlo, creando excepciones y fallos en la aplicación dejando marcadas las dos opciones simultáneamente. Una vez solucionado este último fallo funcional y verificado que el funcionamiento ya era el correcto, se optó por eliminar las imágenes del submenú desplegable de "Database Panel" para así permitir la compatibilidad entre las distintas versiones de Windows:



9.2. PDG

En este panel, se ha optimizado el código, de forma que la búsqueda del nodo raíz para realizar el dibujo del grafo sea aún más rápida, disminuyendo el número de iteraciones en la búsqueda.

9.3. CONSOLA

La consola es una herramienta en la que se habían depositado muchos esfuerzos durante cursos anteriores y a pesar de que su comportamiento era correcto y estable, quedaban bastantes funcionalidades y mejoras por implementar.

Las tareas que se han realizado son las siguientes:

- Adaptación de ejecutables. Al utilizar una consola diferente a la definida por defecto (des.exe), el sistema se volvía inestable y no permitía continuar la ejecución ni realizar acciones como abrir el panel "Asserted Database". Actualmente el sistema permite su funcionamiento tanto con la consola des.exe como hr-sql.exe, estén ubicados en el directorio de la aplicación o uno exterior.

- Múltiples cambios de consola En versiones anteriores sólo se permitía un cambio de consola; actualmente se puede cambiar varias veces de consola sin lugar a error.

9.4. BASE DE DATOS ASERTADA

En el panel de Base de Datos Asertada, se han incluido los tooltips siguientes a los botones:

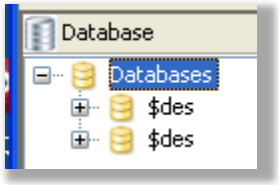
- Icono actualizar: Refresh
- Icono C: Clear

9.5. BASES DE DATOS

En esta nueva versión el panel de Bases de datos ha experimentado cambios y mejoras tanto en su interfaz gráfica como en su funcionalidad. Además, se han corregido ciertos bugs de versiones anteriores que afectaban al buen funcionamiento del panel.

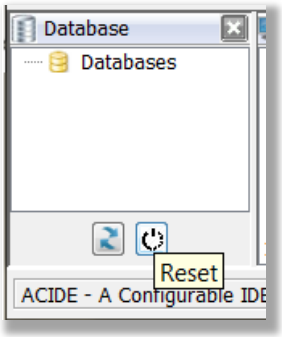
Si bien el panel conserva la estructura y representación original, los cambios más significativos se detallan a continuación:

- Mejora de la comunicación entre consola y panel Database. La comunicación entre el panel Database y DES no parecía hacerse correctamente. Se podía probar cambiando el prompt con "/prompt plain", actualizando el nodo Databases y viendo como aparecía el prompt como hijo de "Databases":



Actualmente, independientemente del prompt en la consola, el panel de Database muestra correctamente los valores de base de datos.

- Reapertura del panel. Una vez se cerraba el panel, de manera puntual, no era posible volver a abrir el panel de nuevo. Este error ya ha sido corregido y el panel puede cerrarse y abrirse sin problemas de manera repetida.
- Creación de botones Refresh y Reset. En el panel, para facilitar y mejorar la interacción con el usuario, se añadido lo botones Refresh y Reset de manera que si se necesita recargar la vista del panel Database, bien podemos simplemente refrescar manteniendo la estructura (botón Refresh) o bien recargamos completamente la estructura que queda recogida (botón Reset). También se han añadido los tooltips correspondientes a cada botón.



9.6. EDITOR DE TEXTOS

A lo largo de las diferentes versiones, el editor de texto ha ido incorporando diversas funcionalidades para mejorar la experiencia del usuario con el mismo.

Nuevas funcionalidades que cumplen con este propósito han sido añadidas en esta versión, las cuales se detallan a continuación:

- Múltiples archivos nuevos. Ahora se permite abrir más de un archivo nuevo simultáneamente, tanto desde el botón Nuevo como desde la entrada del menú, respetando la numeración y reusando numeraciones anteriores.
- Atajo de ejecución. Se ha añadido la opción de cargar en consola el archivo abierto en el editor de textos pulsando simplemente la tecla F9.

9.7. DEPURACIÓN

Dentro del panel de depuración existente, aparte de los paneles que ya poseíamos (paneles de traza Datalog y traza SQL), se ha añadido un nuevo panel de depuración

(Debug SQL) en el cual se muestra un grafo de dependencias con apariencia similar al grafo de dependencias del panel de traza. Para poder mostrar todos los paneles de traza sin añadir más carga de paneles a la apariencia de la interfaz, se ha respetado el método de representación actual, mostrándose mediante un mecanismo de pestañas seleccionables.

9.7.1. TRAZA DATALOG

En el panel de traza Datalog se muestra el grafo de dependencias restringido a una consulta Datalog introducida por el usuario. Las modificaciones en dicho panel se muestran a continuación:

- Modificación del botón Refresh. A fin de facilitar el manejo del usuario y evitar excepciones de código innecesarias, se ha decidido desactivar desde un inicio la pulsación del botón Refresh y reactivarlo una vez se ha cargado alguno de los archivos abiertos. También se ha creado el tooltip específico del botón.
- Desactivación casilla Reglas. En la pestaña Trace Datalog se ha optado por desactivar por defecto la pestaña de Reglas a fin de optimizar el tiempo de carga inicial de la aplicación.
- Modificación de la ventana Query. Se ha cambiado el panel Query de forma que solo se admita una línea de texto como consulta y que dicha consulta se pueda ejecutar al pulsar directamente el botón Intro.
- También se ha revisado la traza de Datalog de forma que nos asegurásemos que el grafo PDG se obtiene de "/tapi /pdg", y no accediendo directamente al predicado dinámico PDG.

9.7.2. TRAZA SQL

En el panel de traza SQL se muestra el grafo de dependencias restringido a una de las vistas que se contienen actualmente en el sistema de bases de datos. Además de la información de dependencias de la base de datos y de las funcionalidades del panel PDG el panel tiene un mecanismo para permitir que el usuario seleccione entre los

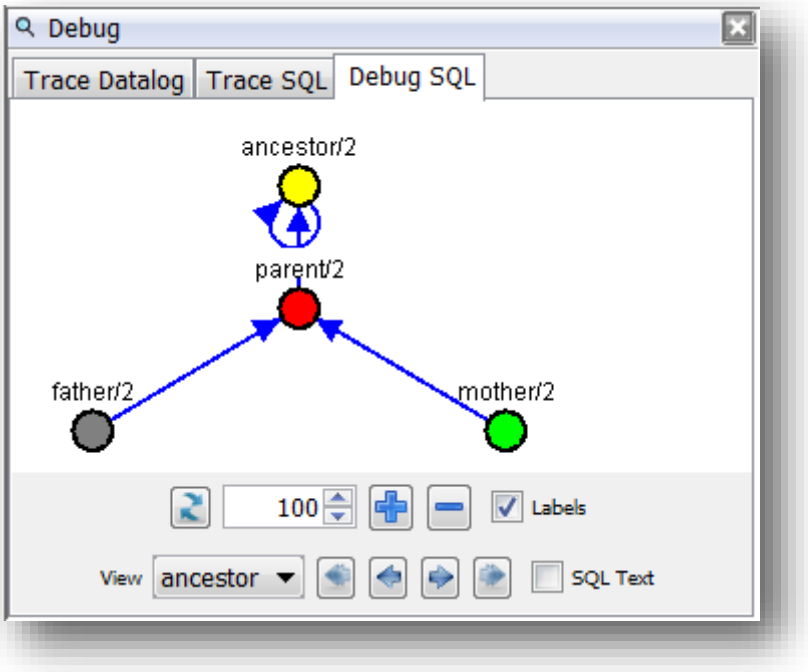
distintos nodos del grafo cuál de ellos quiere seleccionar para ampliar la información del mismo según la información de traza SQL proporcionada por el sistema DES. El trabajo realizado sobre este panel es el siguiente:

- Modificación de la construcción del grafo. Para la construcción del grafo se ha modificado los comandos utilizados, cambiando /pdg por /rdg, usando la versión publicada por Devel en Sourceforge.
- Modificación del botón Refresh. A fin de facilitar el manejo del usuario y evitar excepciones de código innecesarias, se ha decidido desactivar desde un inicio la pulsación del botón Refresh y reactivarlo una vez se ha cargado alguno de los archivos abiertos. También se ha creado el tooltip específico del botón.
- Corrección del bug zoom. En éste panel, cuando se intentaba modificar el zoom sobre el grafo desde los botones "+" y "-", la numeración del zoom que variaba era la de la pestaña Datalog y si se actualizaba el grafo, la numeración no se restablecía a 100. Todos estos fallos han sido corregidos y actualmente cada panel tiene su numeración de zoom acorde a su grafo y no tiene dependencias con otras pestañas.

9.7.3. DEPURADOR SQL

En el panel depurador SQL, al igual que en el de traza, se muestra el grafo de dependencias restringido a una de las vistas que se contienen actualmente en el sistema de bases de datos. Además de la información de dependencias de la base de datos y de las funcionalidades del panel PDG el panel tiene un mecanismo para permitir que el usuario seleccione entre los distintos nodos del grafo cuál de ellos quiere seleccionar para ampliar la información del mismo según la información de traza SQL proporcionada por el sistema DES.

EL objetivo de la creación de esta pestaña es facilitar la depuración al usuario y con tal fin ha sido desarrollado en este curso.



Las especificaciones detalladas a continuación se han basado en las ya existentes en el panel de traza SQL, adaptándolas en función a las necesidades propias de dicha pestaña:

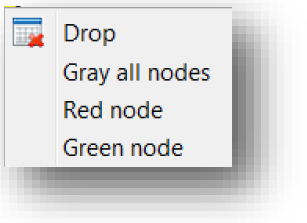
- Al seleccionar uno de los nodos pulsando en el mismo de manera automática se selecciona el nodo de Texto SQL en panel de bases de datos de la interfaz en caso de que el nodo se corresponda con una vista o bien se selecciona el nodo de la tabla del panel de bases de datos si este se corresponde con una tabla.
- Para poder seleccionar la vista que genera el grafo de dependencias se ha introducido en el panel una lista desplegable con las vistas que hay actualmente en la base de datos.

El panel contiene una barra de herramientas en la parte inferior con las acciones que puede realizar el usuario:

- **Actualizar:** Vuelve a generar el grafo de dependencias restringido con el contenido actual de sistema de bases de datos.
- **Nivel de zoom:** Pequeño cuadro donde se muestra y se puede manipular el nivel de zoom del grafo.

- **Etiquetas:** Muestra u oculta las etiquetas con el nombre y la aridad de los nodos.
- **Aumento de zoom:** Aumenta el nivel de zoom del grafo.
- **Disminución de zoom:** Disminuye el nivel de zoom del grafo.
- **Vista:** Abre una lista desplegable con las vistas de la base de datos para que el usuario seleccione aquella a partir de la cual quiere generar el grafo.
- **Primer nodo:** Selecciona el primer nodo de la traza.
- **Nodo anterior:** Selecciona el nodo anterior al nodo seleccionado actualmente en el grafo de la traza.
- **Siguiente nodo:** Selecciona el nodo anterior al nodo seleccionado actualmente en el grafo de la traza.
- **Último nodo:** Selecciona el último nodo de la traza.
- **Definición SQL:** Activa o desactiva el destacado de los nodos de Texto SQL y tabla correspondiente al nodo seleccionado.

Una de las características adicionales de sta pestaña de depuración es la creación de un menú desplegable en cada nodo que permite la modificación del color individual de cada uno de ellos para ayudar así a depurar la vista seleccionada:



El funcionamiento final de dicha pestaña debe permitir las siguientes acciones:

- Marcar un nodo como válido (verde), no válido (rojo) o desconocido (gris). Inicialmente todos son desconocidos.
- El objetivo final de ésta pantalla es facilitar el depurado, marcando de forma automática los nodos en error e interactuando con la consola en cada cambio.

9.8. ACTUALIZACIÓN DEL MANUAL DE USUARIO

Al finalizar la release, se ha realizado una tarea extra, la actualización del manual de usuario. Ha sido una tarea que se ha considerado como fundamental, primero, por todo el trabajo que habían realizado los grupos de cursos anteriores al nuestro por tener un manual completo y claro sobre la aplicación, y segundo, para ofrecer al usuario una guía sencilla que le sirva para poder sacar todo el partido a ACIDE y poder explotar todas las funcionalidades que ofrece.

Para la actualización del manual de usuario se ha partido del manual de usuario de la versión anterior, y se han añadido las nuevas características implementadas en la release. Se han seguido todos los convenios de estandarización descritos en la sección correspondiente de la memoria con el fin de que la memoria sea homogénea y se ha procurado que todas las ampliaciones del manual fueran entendibles para cualquier persona que se disponga a usar ACIDE por primera vez.

9.9. OBJETIVOS CUMPLIDOS

Los objetivos que se han cumplido satisfactoriamente en este proyecto son los que se enumeran a continuación:

9.9.1. TAREAS DE CARÁCTER GENERAL

- Localización al Francés.
- Barra de estado copiable.
- Cambio de ruta de la apertura de archivos.
- Mantenimiento de la estandarización,
- Compatibilidad Windows 7 – Windows XP.

9.9.2. PDG

- Optimización de código en la búsqueda de nodo raíz

9.9.3. DEPURACIÓN

- Dotar a *ACIDE – A Configurable IDE* de una nueva pestaña en el panel de depuración que muestre de manera gráfica las trazas restringidas a consultas SQL permitiendo la depuración de errores de las mismas.
- Modificación del botón Refresh Datalog y SQL.
- Desactivación por defecto casilla Reglas.
- Modificación de la ventana Query.
- Revisión de la traza de Datalog de forma que nos asegurásemos que el grafo PDG se obtiene de "/tapi /pdg", y no accediendo directamente al predicado dinámico PDG.
- Modificación de la construcción del grafo SQL, cambiando /pdg por /rdg, usando la versión publicada por Devel en Sourceforge.
- Corrección del bug existente en el zoom.

9.9.4. BASE DE DATOS ASERTADA

- Modificación de los botones Refresh y Clear

9.9.5. CONSOLA

- Adaptación de diferentes ejecutables.
- Múltiples cambios de consola.

9.9.6. EDITOR DE TEXTOS

- Apertura múltiple de nuevos archivos.
- Atajo de ejecución (F9).

9.9.7. BASE DE DATOS

- Mejora de la comunicación entre consola y panel Database.
- Reapertura del panel.
- Creación de botones Refresh y Reset.

9.9.8. AMPLIACIÓN DEL MANUAL DE USUARIO

- Modificar todas las capturas de pantalla existentes en dicho manual.
- Añadir la información sobre todas las nuevas funcionalidades y modificaciones implementadas.

9.10. OBJETIVOS NO CUMPLIDOS

En el momento que comencé el desarrollo del proyecto, el director Fernando Sáenz Pérez me propuso una lista de objetivos para trabajar sobre la aplicación. Una gran parte del trabajo durante el curso se ha centrado en la mejora de funcionalidades, corrección de bugs y la creación de la nueva pestaña de depuración SQL.

Dada a la priorización de tareas no ha sido posible completar todas las tareas que se planificaron desde el principio, el listado de las tareas que no han podido ser completadas son las siguientes:

- Permitir enviar la señal de interrupción *CTRL + C* a la consola en el sistema operativo Windows. La tarea original era enviar esa señal en cualquier sistema operativo, y se ha conseguido hacer para sistemas operativos no Windows, esto es debido a que Windows no permite al desarrollador la manipulación de la señal. Se dedicó mucho esfuerzo y tiempo en investigar posibles soluciones, se encontró una aplicación desarrollada por terceros que permitía enviar la señal a un proceso elegido por el desarrollador, pero tras integrar esa aplicación, las pruebas no dieron buenos resultados, por lo que se decidió eliminar esta opción en Windows y dejarla operativa para el resto de sistemas operativos.
- Definir e implementar el *análisis sintáctico* para así poder aplicarlo en ACIDE.
- Definir y aplicar hilos en:
    - Apertura de archivos en el editor. De esta forma el usuario tendría el control de la aplicación mientras que se abren archivos.
    - Apertura de proyectos en ACIDE. De forma similar al apartado anterior, el usuario tendría el control de la aplicación mientras termina la carga de un proyecto.
    - Aplicación del formato léxico en el editor de archivos, como ocurre en **Microsoft Word** cuando estamos aplicando la autocorrección. De esta forma el usuario volvería a tener el control de la aplicación

mientras que a los documentos se les aplica la configuración léxica correspondiente.

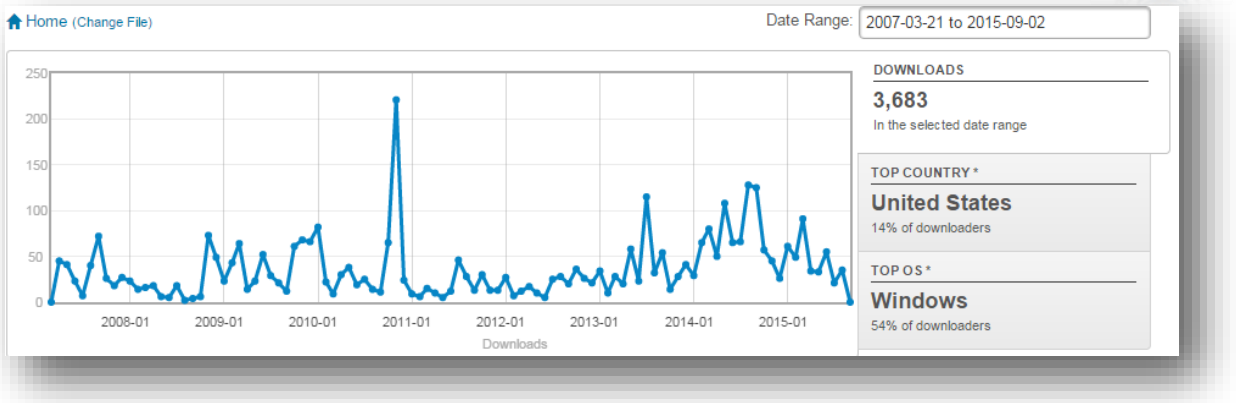
- Opción de *respetar mayúsculas/minúsculas* en los reemplazamientos. Esta era una tarea que exigía una gran cantidad de esfuerzo para conseguir un objetivo menos prioritario, por lo que se decidió dejar en beneficio de otras consideradas más importantes.
- Generar código SQL específico del Sistema Gestor de Bases de Datos para las conexiones ODBC de forma similar a como se hace con DES. Dado el escaso tiempo para culminar otras tareas con prioridad más alta, se decidió relegar esta tarea para futuras versiones.
- Añadir autocompletar a partir del diccionario léxico. Ésta fue una tarea que surgió en las últimas semanas de desarrollo. En estas fechas comenzar esta tarea significaba iniciar el desarrollo de algo desde cero, y dada la proximidad de la entrega y la necesidad de subsanar otros errores, se dejó esta tarea para futuras versiones.
- En el panel de depuración SQL no se ha implementado la automatización en la búsqueda de errores al usuario con el fin de encontrar resultados erróneos o no esperados como se hace en **DES [6]** con los comandos ***/debug_sql*** y ***/debug_datalog***.

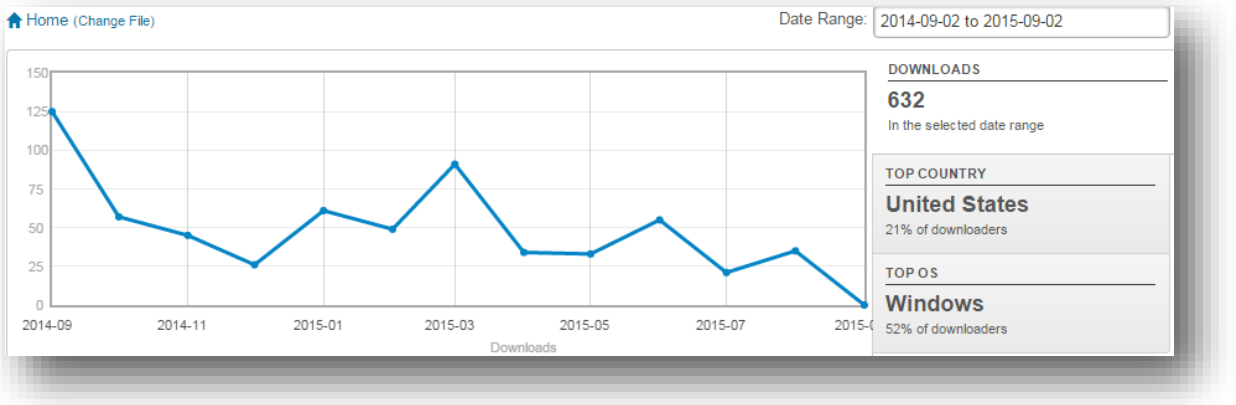
9.11. CONCLUSIONES

Lo primero que hay que debemos tener en cuenta al hablar del desarrollo de la aplicación ACIDE es que no es un proyecto que comienza a desarrollarse desde cero. Cuando recuerdo los primeros días frente a la aplicación, recuerdo un proyecto de gran tamaño (su código fuente llegaba a casi 300.000 líneas) y estable. Esto ha hecho que la metodología de trabajo se haya tenido que adaptar a las circunstancias del proyecto, por lo que la tarea no consistía solo en implementar nuevas funcionalidades, sino que ha habido que aprender la estructura de un proyecto de un tamaño considerable, el diseño de las diferentes partes de la aplicación, cómo se integran esas partes, diseñar soluciones que se integren con el código ya desarrollado y una vez implementadas esas soluciones, probar que la nueva funcionalidad tiene un comportamiento correcto y probar también que los cambios realizados no impactan sobre el funcionamiento del resto de la aplicación.

Otro punto importante, es el hecho que ACIDE es una aplicación publicada y en funcionamiento, que está siendo utilizada por un gran número de personas de distintos países del mundo y que todo lo hecho durante el curso ha sido publicado para éstos usuarios. Esto ha implicado esfuerzo añadido para no romper la experiencia que se le ha ofrecido al usuario durante toda la vida de ACIDE, que tanto esfuerzo les costó conseguir a los compañeros que han participado en este proyecto durante años anteriores.

A continuación se muestran algunas estadísticas interesantes sobre las descargas de ACIDE. Desde la primera publicación se ha llegado a contabilizar un número de descargas superior a 3.600, de las cuales se han producido durante el actual curso académico 632.





Saber que un gran número de usuarios está usando la aplicación que he estado desarrollando ha sido una motivación. La prioridad ha sido dar al usuario la mejor experiencia posible en el uso de ACIDE, ofrecerle más funcionalidades y ofrecerle también opciones para la personalización de su entorno de trabajo.

Todo esto ha supuesto un gran reto y esfuerzo y es por ello por lo que me siento muy satisfecho del trabajo realizado ya que aparte de conseguir añadir funcionalidades nuevas importantes para el usuario, pude aprovechar la experiencia de colaborar en un proyecto real, fuera del ámbito académico y de un tamaño importante, para instalarse en los ordenadores de todos aquellos usuarios de ACIDE a los que esperamos que puedan sacar provecho a todo el trabajo que hemos realizado durante este curso.

10. POSIBLES AMPLIACIONES

En esta sección se listan las posibles mejoras para la aplicación:

- Introducir en el fichero de idioma los atajos de teclado, de este modo los atajos quedarían asociados al idioma cargado en la aplicación.
- Integrar en la pantalla principal la base de datos asertada en lugar de mostrarla en una ventana aparte.
- Permitir el uso de perspectivas como en **Eclipse [12]**. Debido a la gran cantidad de paneles que se muestran en la pantalla principal, puede ser interesante dar la posibilidad al usuario de configurar sus propias perspectivas, con los paneles configurados con la posición y el tamaño que el usuario desee.
- Permitir arrastrar ficheros de texto del ordenador del usuario y soltarlos en ACIDE para que se abran con el editor de textos.
- Permitir arrastrar ficheros de configuración de proyecto y soltarlos en el panel del explorador de proyectos para que se abra el proyecto automáticamente.
- Dar la posibilidad al usuario de ordenar los ficheros de un proyecto en el explorador de proyectos de manera manual.
- Definir un archivo de log para la consola en el que se guarde todas las entradas y salidas de la consola.

11. LISTA DE PALABRAS CLAVES

- DES.
- Datalog.
- Data view.
- Design view.
- Configurable.
- Entorno de desarrollo integrado (IDE).
- Base de datos.
- Editor multi-archivo.
- Búsqueda avanzada.
- Consola.

12. BIBLIOGRAFÍA

Para desarrollar el presente proyecto se han seguido las siguientes fuentes:

- **Explicación de la sintaxis de las restricciones pk, fk, ck, etc.**
  - *Datalog Educational System V3.1 User's Manual. Fernando Sáenz Pérez. Universidad Complutense de Madrid. 2012.*
- **Introducción a la aplicación en el manual:**
  - *ACIDE: An Integrated Development Environment Configurable for LATEX. Fernando Sáenz Pérez. The Practex Journal No3. 2007. http://dw.tug.org/pracjourn/2007-3/saenz_perez-acide/saenz_perez-acide.pdf*

13. REFERENCIAS

[1] D. Cardiel Freire, J. J. Ortiz Sánchez y D. Rupérez Cañas. ACIDE: A Configurable IDE. Universidad Complutense de Madrid. 2007.

[2] M. Martín Lázaro. ACIDE 0.2: a configurable integrated development environment. Universidad Complutense de Madrid. 2008.

[3] J. Salcedo Gómez. ACIDE: A Configurable IDE. DES GUI Front-end. Universidad Complutense de Madrid. 2011.

[4] P. Gutiérrez García-Pardo, E. Tejeiro Pérez de Ágreda, A. Vicente del Cura: A Configurable IDE. DES GUI Front-end. Universidad Complutense de Madrid. 2013

[5] J. J. Marqués Ortiz, F. Ordás Lorente y S. Gutiérrez Quintana: A Configurable IDE. DES GUI Front-end. Universidad Complutense de Madrid. 2014

[6] Página oficial de DES: http://www.fdi.ucm.es/profesor/fernan/des/index.html

[7] Página oficial de Crimson Editor: http://www.crimsoneditor.com

[8] Página oficial de JEdit: http://www.jedit.org

[9] Página oficial de JBuilder: http://www.borland.com/jbuilder

[10] Página oficial de JCreator: http://www.jcreator.com

[11] Página oficial de C++ Builder: http://www.borland.com/cppbuilder

[12] Página oficial de Eclipse: http://www.eclipse.org/

[13] Página oficial de Visual Studio Shell: http://msdn.microsoft.com/en-us/library/vstudio/bb685691.aspx

[14] Página oficial de WinEdt: http://www.winedt.com/

[15] Página oficial de NetBeans: http//netbeans.org

[16] Página oficial de MS Access: http://office.microsoft.com/es-es/access/

[17] Página oficial de Oracle: http://www.oracle.com

[18] Página oficial de Postgres: www.postgresql.org/

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[20] Febbraro, O., Reale, K., Ricca, F.: ASPIDE: Integrated Development Environment for Answer Set Programming. In: Delgrande, J., Faber, W. (eds.) LPNMR 2011, LNAI 6645, pp. 317-330, 2011. Página oficial de ASPIDE: http://www.mat.unical.it/ricca/aspide/

[21] Página oficial de Dropbox: http://www.dropbox.com/

[22] Página oficial de Notepad++: http://www.notepad-plus-plus.org/

[23] Página de referencia para la implementación del line wrapping: http://java-sl.com/wrap.html

[24] Página oficial de GitHub: https://github.com/

14. INFORMACIÓN DE CONTACTO

Este proyecto es código libre. Por tanto, todo el código fuente y ejecutables están disponibles en las siguientes direcciones de internet:

- **Ejecutable**: *http://www.fdi.ucm.es/profesor/fernan/ACIDE/*
- **Código fuente:** *http://sourceforge.net/projects/acide/files/acide/*

Si quisiera ponerse en contacto con alguno de los desarrolladores del proyecto puede hacerlo a través de las siguientes direcciones de correo electrónico:

- **Sergio Domínguez Fuentes:** ser_df@hotmail.com

APÉNDICE: MANUAL DE USUARIO

USER'S MANUAL

VERSION 0.17

SUMMARIZED INDEX

INDEX OF CONTENTS

INDEX OF FIGURES

1. SYSTEM REQUIREMENTS

1.1. USER

ACIDE - a Configurable IDE does require neither special system configurations nor special system requirements because the executable file is attached in its distribution, making the execution of ACIDE - A Configurable IDE easy and comfortable to the users.

ACIDE – A Configurable IDE is **cross-platform** and has been tested on ***MS Windows XP/Vista/7***, ***Ubuntu Linux 10.04.1***, ***Ubuntu Linux 12.04***, and ***MacOSX Snow Leopard***. Executables for all of these operating systems are provided. The only mandatory requirement is the previous installation of the ***Java Virtual Machine (JVM)***. The user will have to get the *JRE installation file* with **1.6 and later versions**, which is available in the following link:

http://www.java.com/es/download/manual.jsp.

Only with this easy and fast step the user will be able to run *ACIDE - A Configurable IDE* on his computer without problems. However, in order to fully enjoying all the features of the application such as *ACIDE - A Configurable IDE grammar configurations*, two extra tools will have to be also installed: ***javac.exe*** and ***jar.exe***.

Those tools are available in the ***Java Development Kit (JDK)*** installation file, which is available in the following link:

http://www.oracle.com/technetwork/java/javase/downloads/index.html

At last, in order to visualize the present document, it is mandatory for the users to have previously installed any software for **PDF files visualization**.

1.2. DEVELOPER

For developers, it is mandatory to have previously installed the ***Java Development Kit (JDK)*** with 1.6 and later versions and any software for the edition of the source code.

The source code has been fully edited with the **Eclipse IDE** tool which is available in:

http://www.eclipse.org/

Furthermore, with the *ACIDE - A Configurable IDE* source code distribution, the Eclipse *project file* is available. The developer has to import the project file into Eclipse and start the edition, fast and simple.

1.3. EXECUTING ACIDE

User has to unpack the distribution archive file into the directory he wants to instal *ACIDE – A Configurable IDE*, which will be referred to as the distribution directory from now. Since it is a portable application, it needs to be started from its distribution directory, which means that the start-up directory of the shortcut must be the distribution directory.

To execute *ACIDE – A Configurable IDE* on the different *SOs,* user only has to run the **des_acide.jar** file to open an instance of the application preconfigured to work with *DES*. At Windows, the user only have to do double click in the file. He also can create a script or an alias for executing the file at the distribution root, typing:

```
java –jar des_acide.jar
```

or, to avoid that console depends on executable:

```
javaw –jar des_acide.jar
```

Linux and *Linux* the user can create a script or an alias for executing the file **des_acide.jar** at the distribution root, typing:

```
java –jar des_acide.jar
```

2. INTRODUCING ACIDE

ACIDE – A Configurable IDE is a cross-platform, open-source Integrated Development Environment (IDE). It has been developed by different teams of students coursing *Computing Systems* and directed by Fernando Sáenz Pérez. Next, *ACIDE – A Configurable IDE* features will be further explained:

2.1. TECHNOLOGY

The implementation of the application has been completely done using *Java* under *Eclipse.* Version control was kindly provided by *Tortoise SVN.*

2.2. THE MAIN GUI

Figure 1 shows the main GUI of ACIDE. It consists of six main panels. The top panel on the left shows the organistation of the current project, the top panel in the middle are the opened files which may belong to the project (files may be opened without assigning them to the project), the top panel on the right side is the graph panel, which shows the PD. Below, the left panel shows the databases system connected with ACIDE, which allows user interaction. Beside, the console panel is shown. The case shown is the DES console and on the right side the debug panel is shown, which allows the graphical debugging. The databases, console, project, graph and debug panels can be hidden. Also, these panels can be switched by a drag and drop action. For this purpose, the menu bars (or the tabbed pane in the File Editor) in the panels can be selected using the left mouse button, after that, the panels can be dragged and released one in another. Moreover, there is no need to work with projects if this flexibility is not needed; a regular user may use the system as is. The status of the GUI is remembered for the next time the tool is executed. If the tool opens a project, its status when it was last saved is restored.

The menu bar includes some common entries:

- **File**: For file related operations.

- **Edit**: For clipboard related operations, *Search*, *Replace*, *Undo*, *Toggle Comment, Make Comment, Release Comment, Change Case, Redo, Select All* and *Go To Line*.
- **Project**: For project related operations.
- **View**: For showing/hiding project, console, database, graph, debug and asserted database panels, and displaying the log. Window arrangements are not possible up to now, but usual features are cascading and tiling windows both vertically and horizontally.

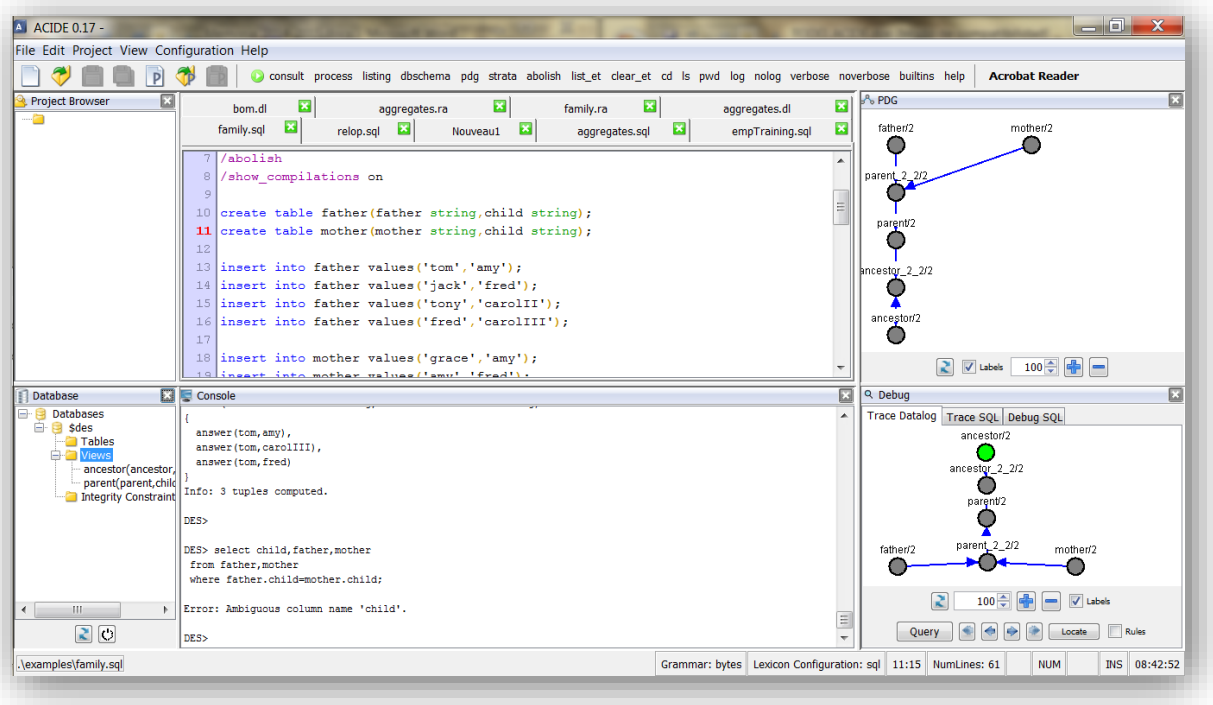


Figure 1: ACIDE Main GUI

- **Configuration:** This entry allows to configure *Lexicon (*for syntax highlight ing.), *Grammar* (for parsing on the fly), *Compiler* (for compiling the project), *File Editor (*for changing the display and behavior of the editors), *Console* (the console in the right bottom panel), *Database Panel*(the database panel in the left bottom panel), *Graph Panel* (then panel in the right side), *Language* of the GUI, *Menu* (for the configuration of the menu bar) and *Toolbar* for the commands, which can be displayed either as icons or textual descriptions. Tooltips for toolbar commands can be configured.
- **Help:** This entry contains *Show Help* and *About ACIDE*.

In addition, there is a fixed toolbar, which includes common buttons for the file and project related basic operations: *New, Open, Save* and *Save All* (this last one only for files). Next to the fixed toolbar, there is the configurable toolbar.

Finally, the status bar gives information about some items: The complete path of the selected file the selected grammar and lexicon, the line and column numbers, Caps Lock, Scroll Lock, Num Lock and current time.

All these components will be further explained throughout this document.

2.3. PROJECTS

A project contains the whole status of a session, which is defined by all the possible configurations as well as the current display status. It consists of files arranged in folders (with any tree depth), all the configurations for the session (lexicon, grammar, compiler, console, language, file editor, menu and toolbar), main GUI arragement (panel sizes, and opened files in the project), and file attributes. File attributes identify a file in a project as compilable and/or main. If a file is compilable, then the compiler configuration can be set to compile each of these files. If a file is a main file (there is only one in the project), then it can be used in the compiler configuration or in the toolbar commands.

The project structure shown in folders is a logical view which may coincide with the physical structure of the *OS* folders, but this is not needed. User can include in a given project a file belonging to another tree structure, therefore allowing to share files for different projects.

2.4. CONFIGURATION

The main objetive of this system is to be as highly configurable as possible, keeping the configurations easy and portable by means of text files. The user can configure the *Lexicon, Grammar, Compiler, File Editor, Console, Database Panel, Graph Panel, Language, Menu* and *Toolbar.* These configurations will be further explained throughout this document.

3. MENU BAR

Next we further detail each one of the submenus that *ACIDE – A Configurable IDE* as default. As is explained in *Chapter 3.5.10* the user can insert new menu submenus and items. In *Chapter 3.7* and *Chapter 0* we explain how to use these objects. We also explain how to configure this menu externally with *XML* files in *Chapter 16.3.1.*

3.1. FILE MENU

It contains the following menu items for the files management:

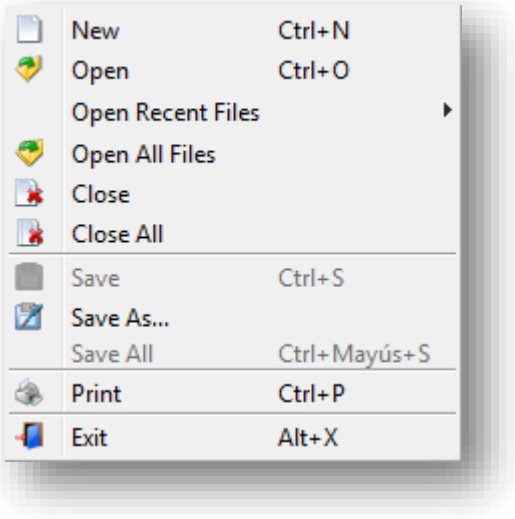


Figure 2: File Menu

Next, all the previous menu items will be further explained:

3.1.1. NEW

Create a new empty file in the file editor.

3.1.2. OPEN

Open a previously saved file into the file editor.

3.1.3. OPEN RECENT FILES

Display a list which contains all the files that have been opened previously in the file editor and the option to set the list to empty.

3.1.4. Open all files

Open all the files associated to the current project in the file editor.

3.1.5. Close file

Close the active file in the file editor, asking to the user if he wants to save it if the file was previously modified.

3.1.6. Close all files

Close all the opened files in the file editor, asking to the user if he wants to save them if the files were previously modified.

3.1.7. Save file

Save the active file in the file editor at the same path that it was previously saved.

3.1.8. Save file as

Save the active file in the file editor into a different path than it was saved before.

3.1.9. Save all files

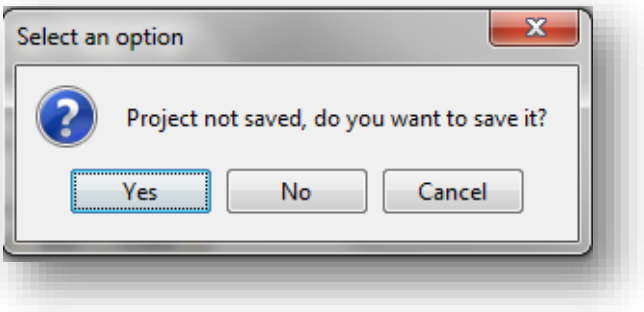
Save all files opened in the file editor.

3.1.10. Print file

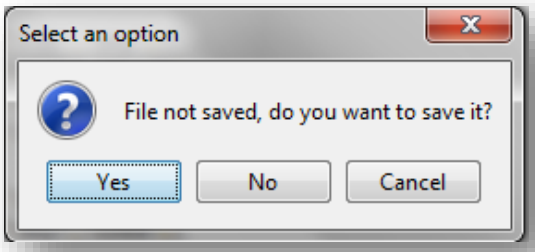
Print the active file in the file editor.

3.1.11. Exit

Close the application and if any changes have been encountered in the current project configuration, display the following dialog to the user:



Adittionally, if any of the opened files in the file editor has been modified, it will asked to the user for saving them with the following dialog:



The user can abort the exit process in any time by cancelling any of the previous dialogs.

3.2. EDIT MENU

Contain the following menu items for the common file editor management:

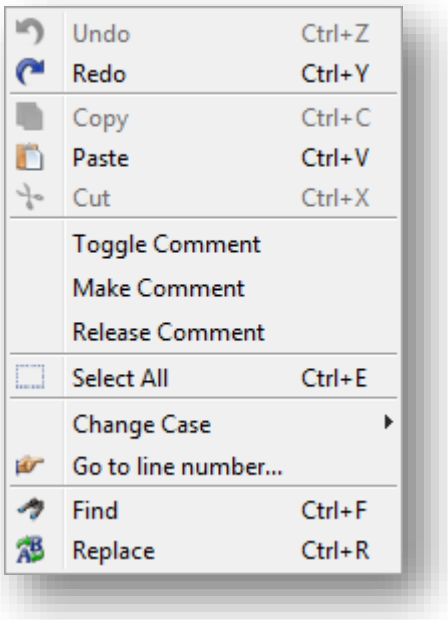


Figure 3: Edit Menu

Next, all the previous menu items will be further explained:

3.2.1. UNDO

Undo the changes in the file editor setting the focus on the file which is the owner of the change.

3.2.2. REDO

Redo the changes in the file editor setting the focus on the file that is the owner of the change.

3.2.3. COPY

Copy the selected text in the active file in the file editor or in the console and put it into the system clipboard.

3.2.4. PASTE

Paste the text stored in the system clipboard in the current position of the active file in the file editor or in the console.

3.2.5. CUT

Cut the selected text in the active file in the file editor or in the console and put it into the system clipboard.

3.2.6. TOGGLE COMMENT

Comment or uncomment the line according to whether the line is commented or not.

3.2.7. MAKE COMMENT

Comment the selected line. In case there is no selection, comment the line where the cursor is located.

3.2.8. RELEASE COMMENT

Uncomment the selected line. In case there is no selection, uncomment the line where the cursor is located.

3.2.9. CHANGE CASE

Contain the following menu item options for the customization of texts :

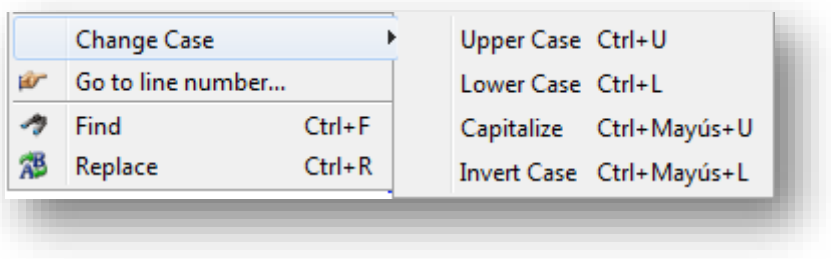


Figure 4: Change Case Menu

3.2.9.1 UPPER CASE

Transform to upper case the selected text. In case there is no selection, transform the current word where the cursor is located.

3.2.9.2 LOWER CASE

Transform to lower case the selected text. In case there is no selection, transform the current word where the cursor is located.

3.2.9.3 CAPITALIZE

Capitalize the first letter of every word in the selected text. In case there is no selection, capitalize the current word where the cursor is located.

3.2.9.4 INVERT CASE

Transform to upper case the lower case letters and viceversa.

3.2.10. SELECT ALL

Select all the content of the active file in the file editor.

3.2.11. GO TO LINE

Display a dialog in which the user will type down the number of the line where he wants to place the caret cursor in the active file in the file editor:

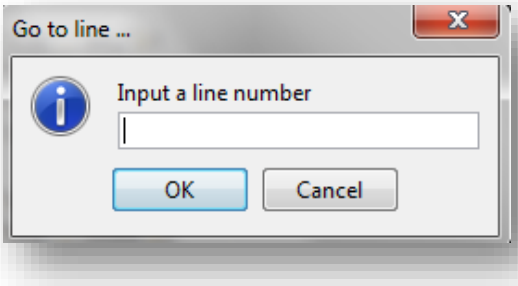


Figure 5: Go to line window

3.2.12. SEARCH

Show the search text window of the file editor:

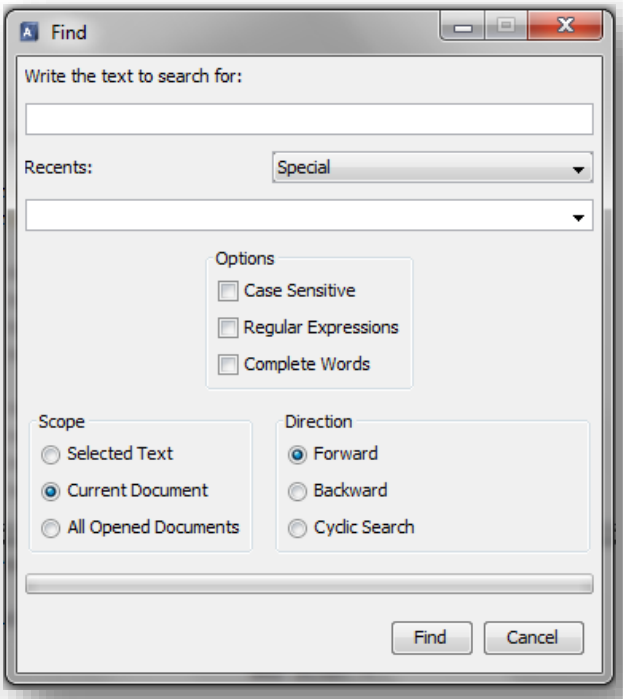


Figure 6: Search window

Then we proceed to describe each component of the window:

- **Text box:** Here is where user enters the search text.
- **Special:** You can search for paragraph breaks and tabs by the special marks ^p and ^t. These special marks can be written in the text box or selected in the Special combo menu.

- **Recents:** This combo menu displays a list which contains all the recent searches that have been executed before. When user selects one, this appears in the Text box.
- **Options:**
  - **Case sensitive:** this option is used to search for strings without having or taking into account the Upper / Lowercase.
  - **Regular expressions:** regular expressions search associated with a search pattern. More information about Regular Expressions in *Chapter 17*.
  - **Whole words:** find whole words only.
- **Scope:**
  - **Selected text:** search within a selected text.
  - **Current document:** document-search starting in a certain position of the active file of File Editor.
  - **All opened documents:** search in all opened files on the file editor.
- **Direction:**
  - **Forward:** search from the current caret position to the end of the file in the source file editor.
  - **Backward:** search from the current caret position to the beginning of the file in the source file editor.
  - **Cyclic:** search from the current caret position to the end of the file in the source file editor, and star from the beginning until the starting position.
- **Progress bar:** shows the progress of the active search.

3.2.13. REPLACE

Display the replace text window on the file editor:

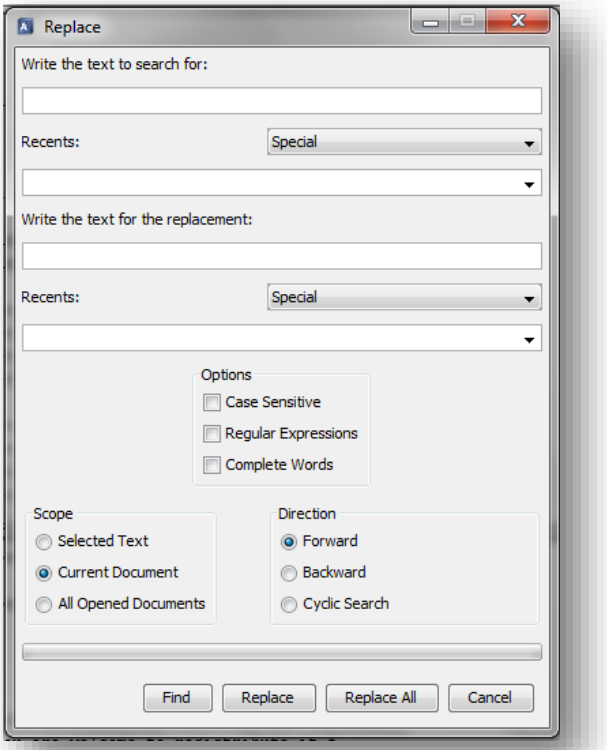


Figure 7: Replace window

Offer the same options than the search window and also the **replace buttons** and the **replace text field** to select the text to use for the replacements:

- **Search text box:** Here is where user enters the search text.
- **Special:** You can search for paragraph breaks and tabs by the special marks ^p and ^t. These special marks can be written in the text box or selected in the Special combo menu.
- **Recents searches :** This combo menu displays a list which contains all the recent searches that have been executed before. When user selects one, this appears in the Text box.
- **Replace text box:** Here is where user enters the replace text.
- **Special:** You can replace with paragraph breaks and tabs by the special marks ^p and ^t. These special marks can be written in the text box or selected in the Special combo menu.

- **Recents replaces :** This combo menu displays a list which contains all the recent replacements that have been executed before. When user selects one, this appears in the replaces Text box.
- **Options:**
    - **Case sensitive:** this option is used to search for and replace strings without having or taking into account the Upper / Lowercase.
    - **Regular expressions:** regular expressions search associated with a search pattern. More information about Regular Expressions in *Chapter 17*.
    - **Whole words:** find whole words only.
- **Scope:**
    - **Selected text:** search within a selected text.
    - **Current document:** document-search starting in a certain position of the active file of File Editor.
    - **All opened documents:** search in all opened files on the file editor.
- **Direction:**
    - **Forward:** search from the current caret position to the end of the file in the source file editor.
    - **Backward:** search from the current caret position to the beginning of the file in the source file editor.
    - **Cyclic:** search from the current caret position to the end of the file in the source file editor, and star from the beginning until the starting position.
- **Progress bar:** show the progress of the active search or replacement.

When a general replacement is performed, display the following dialog to the user informing of the *number of replacements:*

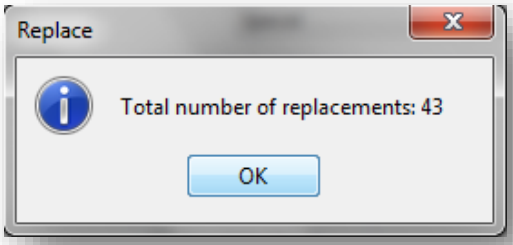


Figure 8: Number of replacements

3.3. PROJECT MENU

Contain the menu items required for the project configurations management:

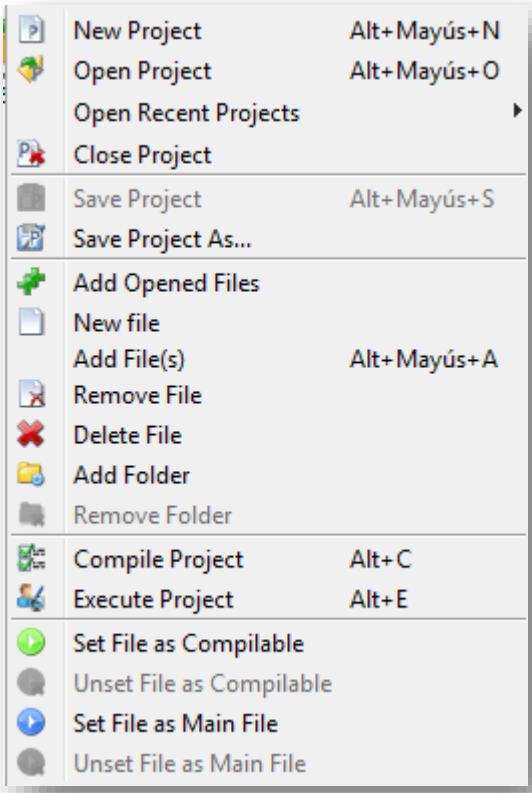


Figure 9: Project menu

Next, all the previous menu items will be further explained:

3.3.1. NEW PROJECT

Configure a new project displaying the following configuration window:

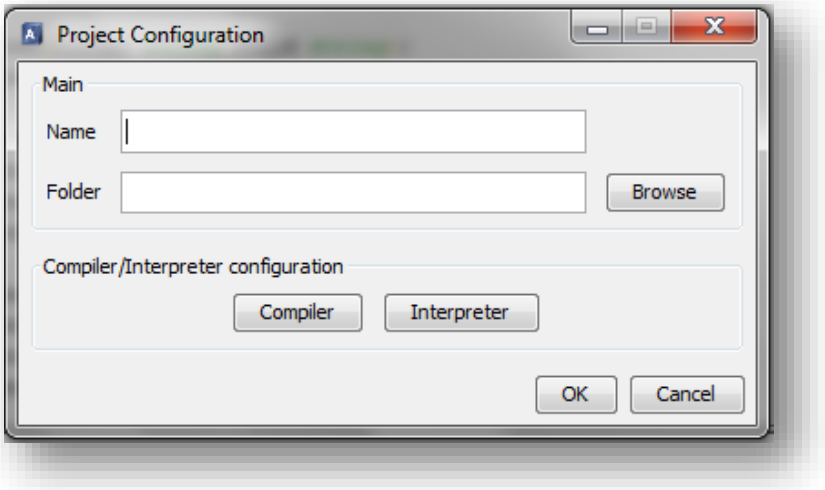
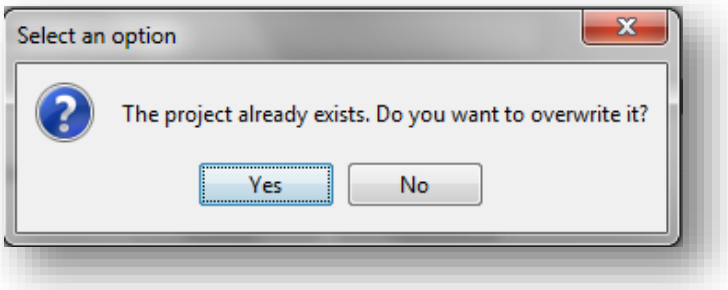


Figure 10: Project configuration

Next, the window options are further described:

- **Name:** indicate the project name.
- **Folder:** indicate the folder where the project file will be placed. If the project file already exists in the folder the application will give the chance to the user to overwrite it or not:



- **Compiler/Interpreter options**
  - **Compiler:** select the compiler configuration for the new project.
  - **Interpreter:** select the console panel configuratoin for the new project.

3.3.2. OPEN PROJECT

Open an existing project.

3.3.3. OPEN RECENT PROJECTS

Display a list with the projects that have been already opened in the application and the option to set the list to empty.

3.3.4. CLOSE PROJECT

Close the current project and sets the default configuration.

3.3.5. SAVE PROJECT

Save the current project configuration into its configuration file.

3.3.6. SAVE PROJECT AS

Saves the current project configuration into a different configuration file.

3.3.7. NEW PROJECT FILE

Create a new empty file in the file editor and adds it to the current project configuration after asking to the user for its final destination.

3.3.8. ADD ALL OPENED FILES

Add all the opened files in the file editor to the current project configuration. Files that already belong to the project will not be included again.

3.3.9. ADD FILE

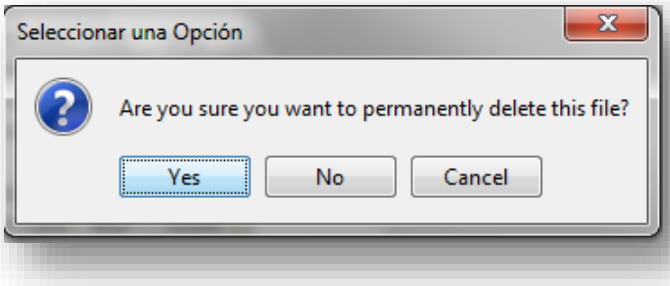
Add the active file in the file editor to the project configuration.

3.3.10. REMOVE FILE

Remove the file from the project configuration but does not deletes it from disk.

3.3.11. DELETE FILE

Remove the file from both project configuration and disk previous user confirmation:



3.3.12. ADD FOLDER

Add a new folder to the project in the selected level at the explorer tree, and check that it does not exist another folder with the same name before adding it:

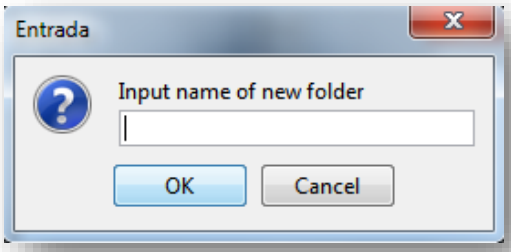
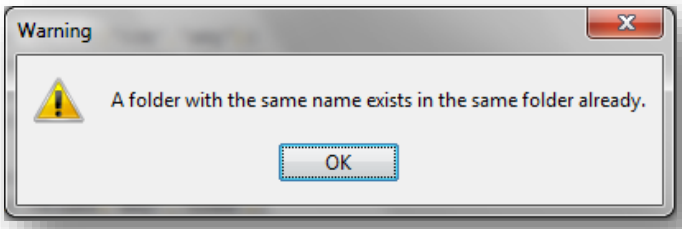


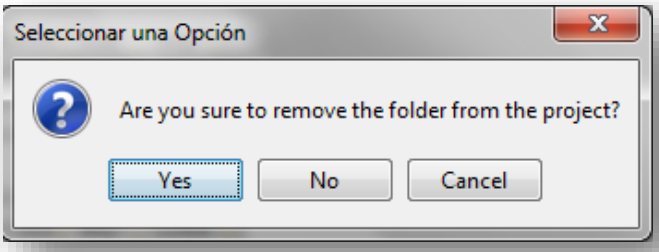
Figure 11: Add folder

If already exist another folder with the same name at the same level at the explorer tree, display the following message and does not add it:



3.3.13. REMOVE FOLDER

Remove the folder from the project configuration previous user's confirmation:



3.3.14. COMPILE PROJECT

The project is compiled with the selected parameters in the compiler configuration window that will be further detailed in the following chapters of the present document. Next, we ilustrate its usage with two examples.

3.3.14.1. COMPILATION BASED ON "EXTENSION"

The process has the following steps:

- First, in the compiler configuration window the user selects the extension of the files that he wants to compile:

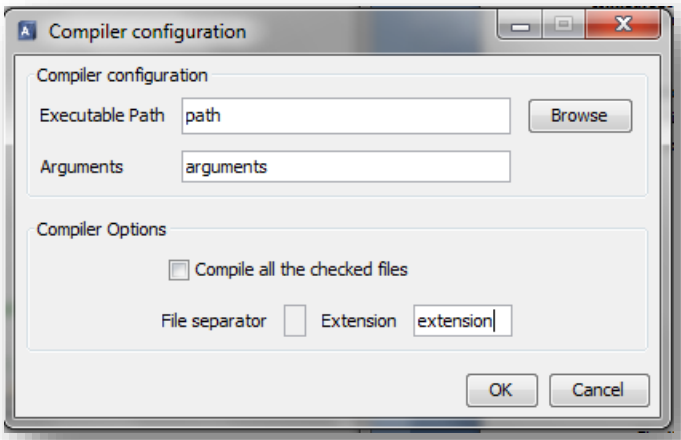


Figure 12: Compilation by extension

Finally, the project is compiled using the *Menu/Project/Compile* menu item option.

3.3.14.2. COMPILATION BASED ON "MARKED FILES FOR COMPILATION"

The process has the following steps:

- First, the user marks all the files that he wants to compile in the file editor or in the explorer tree using the option for this purpose:

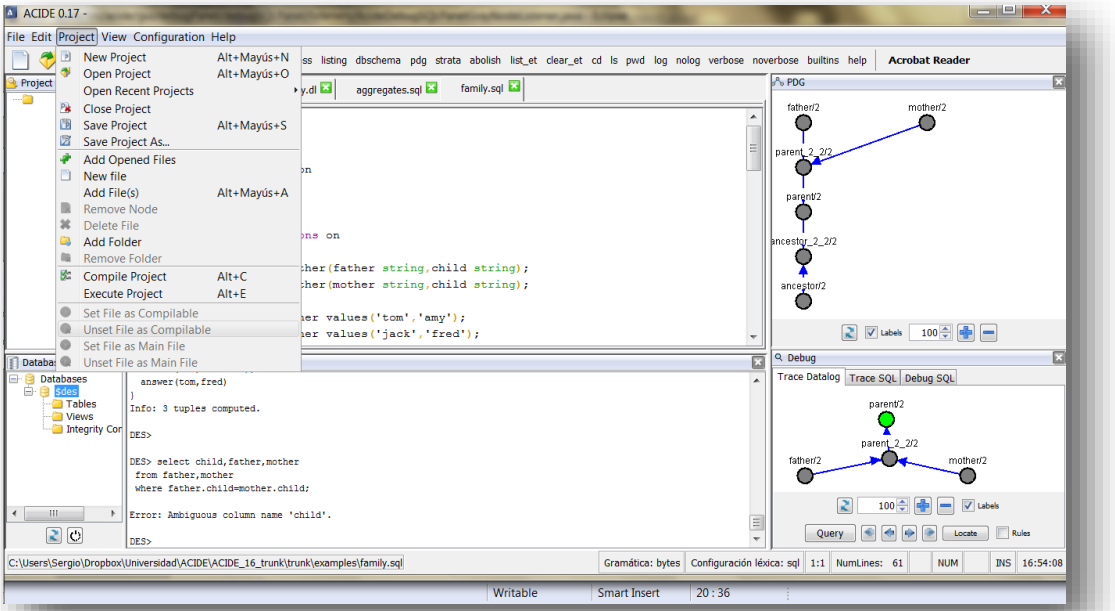


Figure 13: Marking files

- Next, the user configures the compiler options in the compiler configuration as follows:

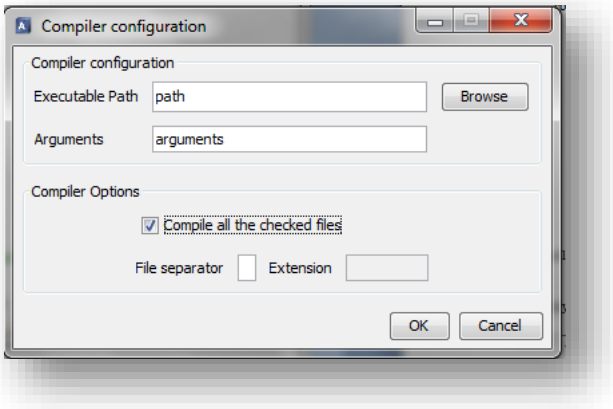


Figure 14: Compilation by marked files

Finally, the user selects the *Menu/Project/Compile* menu item option.

3.3.15. EXECUTE PROJECT

It displays the following configuration window:

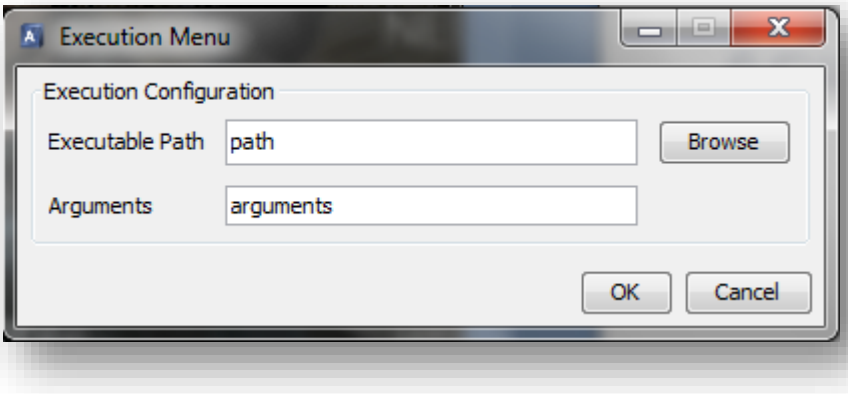


Figure 15: Execution menu

Next, we further detail all the window components:

- **Executable path:** path of the selected executable.
- **Executable arguments:** arguments for the selected executable.

The result of the execution is displayed in the following progress window:

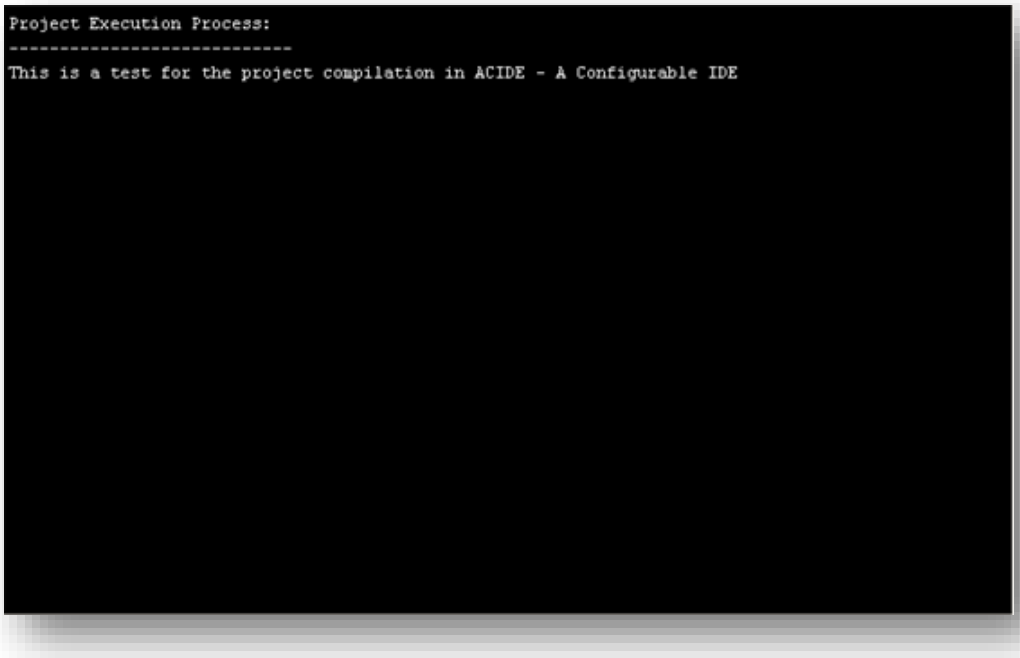


Figure 16: Execution process

3.3.16. SET COMPILABLE FILE

Set the active file in the file editor as compilable.

3.3.17. UNSET COMPILABLE FILE

Unset the active file in the file editor as compilable.

3.3.18. SET MAIN FILE

Set the active file in the file editor as main.

3.3.19. UNSET MAIN FILE

Unset the active file in the file editor as main.

3.4. VIEW MENU

Contain the menu items for the displaying management of the visible parts of the application and the log visualization:

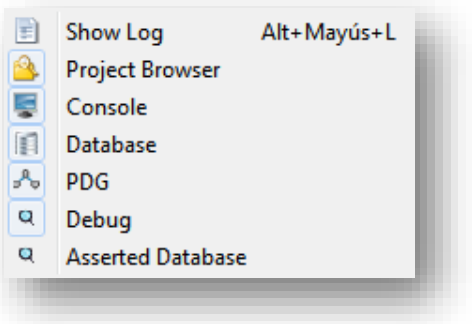


Figure 17: View menu

Next, all the previous menu items will be further explained:

3.4.1. SHOW LOG

Show the application log in the file editor.

3.4.2. PROJECT BROWSER

Hide or show the explorer panel. This panel can be also hidden clicking the button in the project browser menu bar.

3.4.3. CONSOLE

Hide or show the console panel. This panel can be also hidden clicking the button in the console menu bar.

3.4.4. DATABASE

Hide or show the database panel. This panel can be also hidden clicking the button in the database menu bar.

3.4.5. PDG

Hide or show the graph panel. This panel can be also hidden clicking the button in the PDG menu bar.

3.4.6. DEBUG

Hide or show the debug panel. This panel can be also hidden clicking the button in the debug menu bar.

3.4.7. ASSERTED DATABASE

Open the Asserted Database window.

3.5. CONFIGURATION MENU

Contain all the menu item options for the configuration management of all the modules of the application:

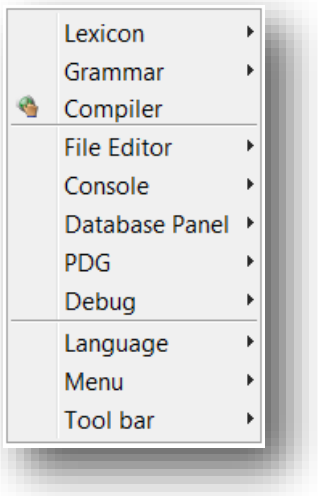


Figure 18: Configuration menu

3.5.1. LEXICON CONFIGURATION

Contain all the menu item options for the lexicon configuration management of the application:

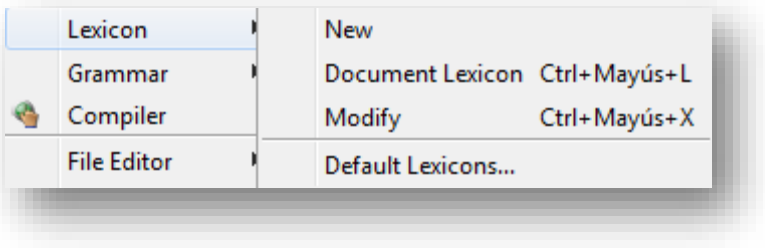


Figure 19: Lexicon menu

We also explain how to configure lexicons externally with *XML* files in *Chapter 16.5.* Next, all the previously mentioned options are further explained:

3.5.1.1. NEW LEXICON

Create a new lexicon configuration with the name that the user types down in the following window applying it to the active file in the file editor:

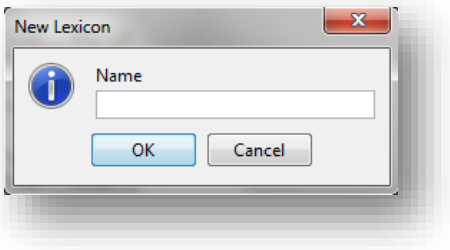


Figure 20: New lexicon

3.5.1.2. DOCUMENT LEXICON

Load the lexicon configuration file with **XML** extension in the active file in the file editor.

3.5.1.3. MODIFY LEXICON

Open the lexicon configuration window that contains the following tabs:

3.5.1.3.1. RESERVED WORDS CONFIGURATION

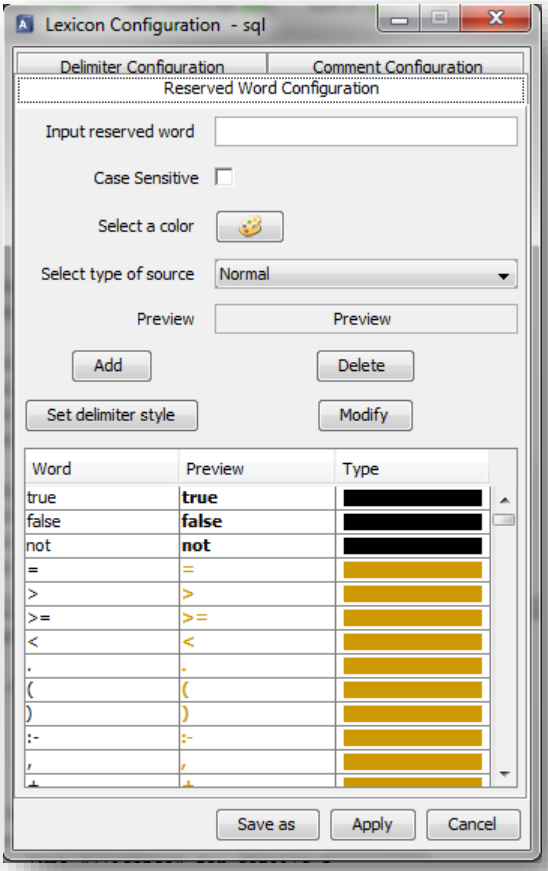


Figure 21: Reserved words

Next, we further describe each one of its components as follows:

- **Add:** add a new table reserved word entry.
- **Delete:** remove a table reserved word entry.
- **Modify:** modifie a table reserved word entry.
- **Set delimiter style:** the delimiter list now is also taken as reserved words.
- **Table:** contain the list with the reserved words groups by types and colors. *Note:* it is not allowed to modify the table entries directly on the table itself and the changes will not be applied until the **modify button** is pressed down.

3.5.1.3.2. DELIMITERS CONFIGURATION

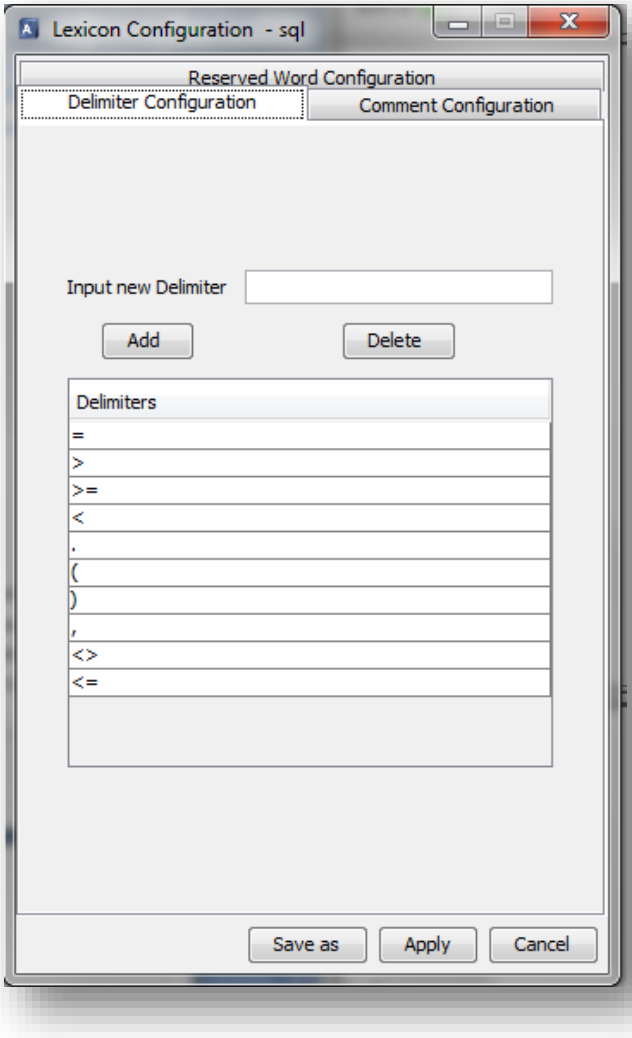


Figure 22: Delimiters configuration

Next, all its components are further detailed:

- **Input new delimiter text field:** the user inputs the name of the new delimiter.
- **Add button:** add the input delimiter in the text field to the table.
- **Delete button:** remove selected delimiter from the table.
- **Table:** contain the delimiter list, and it is possible to modify it directly on it.

3.5.1.3.3. REMARKS CONFIGURATION

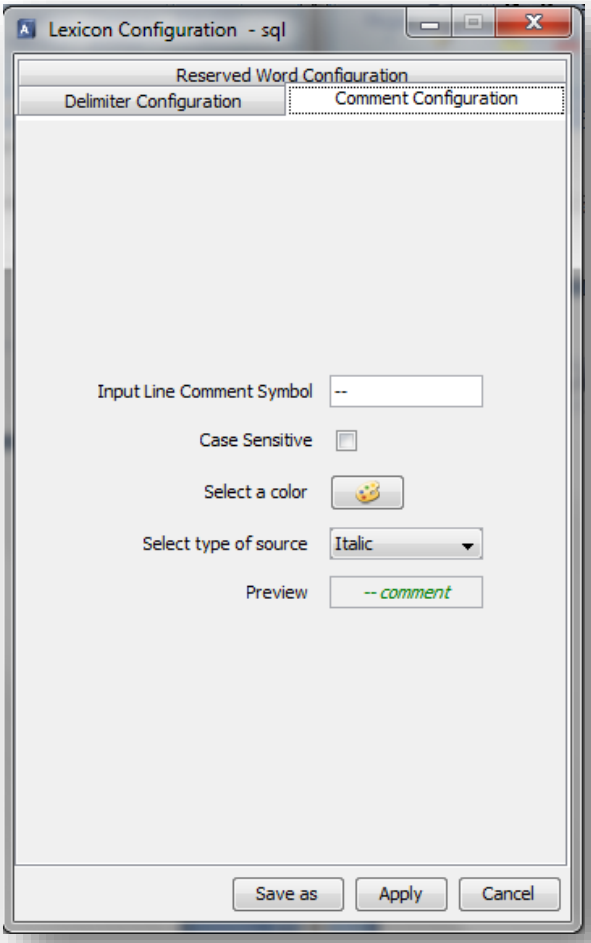


Figure 23: Remarks configuration

Next, we further detail all its components:

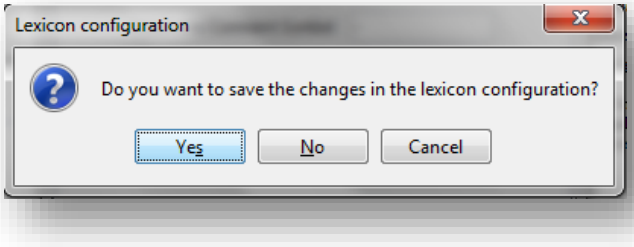
- **Comment symbol text field:** for input the remark symbol.
- **Case sensitive check box:** for specify if the remark is case sensitive or not.
- **Color selection button:** for the color selection of the remarks.
- **Font style combo box:** for the font style selection.
- **Preview text field:** show a preview of the remarks.

The lexicon configuration window has in the bottom side the following buttons:

- **Save as:** save the current lexicon configuration in other path with **XML** extension.

- **Apply:** apply the changes to all the opened files with the current lexicon configuration in the file editor and saves the changes in the configuration file with **XML** extension.
- **Cancel:** close the lexicon configuration window without applying the changes.

Finally, if there are any changes in the current configuration in the previously described panels and the user closes the window with the close button or the *ESC* key, the following dialog will be displayed:



3.5.1.4. DEFAULT LEXICONS

Show the default lexicons configuration window:

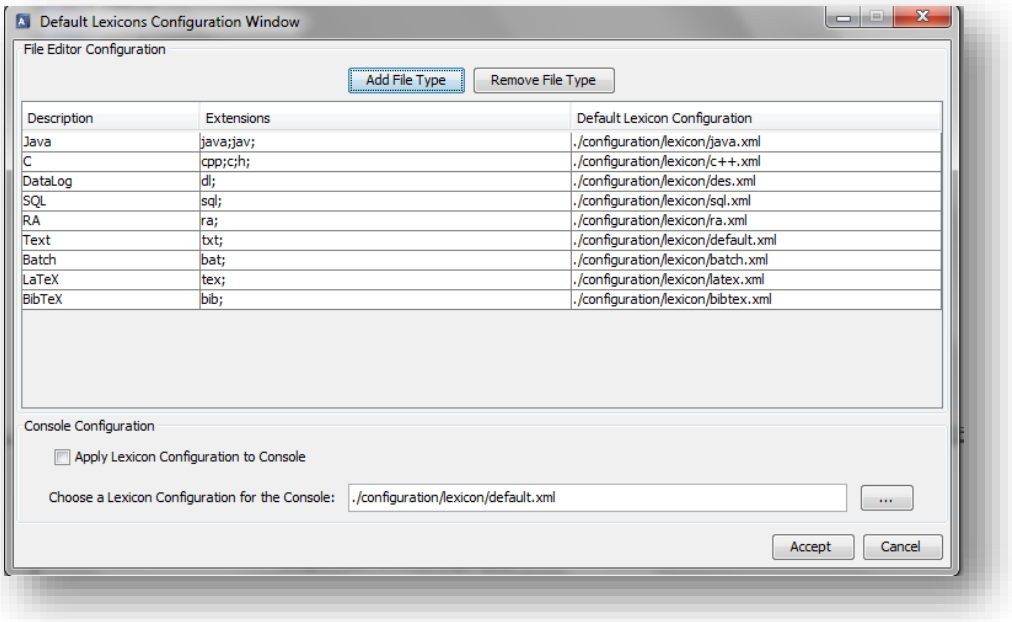


Figure 24: Default lexicons

Next, we explain each one of its components:

- **File editor configuration:** contain the elements for the default lexicon configurations management in the file editor:
  - **Add file type:** add a new default lexicon configuration to the table.
  - **Remove file type:** remove a default lexicon configuration from the table.
  - **Table:** contain the following columns:
    - **Description.**
    - **Extensions:** extensions list separed by ";". *Note*: the format ".txt" is not a valid extension.
    - **Default lexicon configuration.**
- **Console configuration:** contain the elements for the default lexicon configurations management in the console panel:
  - **Apply lexicon configuration to the console:** indicate if the default lexicon configuration has to be applied or not to the console panel.
  - **Console lexicon configuration.**

3.5.2. GRAMMAR CONFIGURATION

Contain the menu item options for the grammar configuration management:

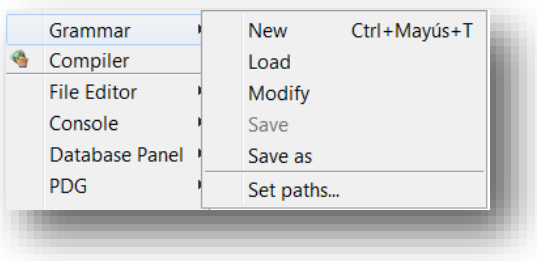


Figure 25: Grammar menu

Next, we further explain each one of the previous menu item options:

3.5.2.1. NEW GRAMMAR

Create the new grammar configurations from lexicon categories and grammar rules with *EBNF* format in the following configuration window:

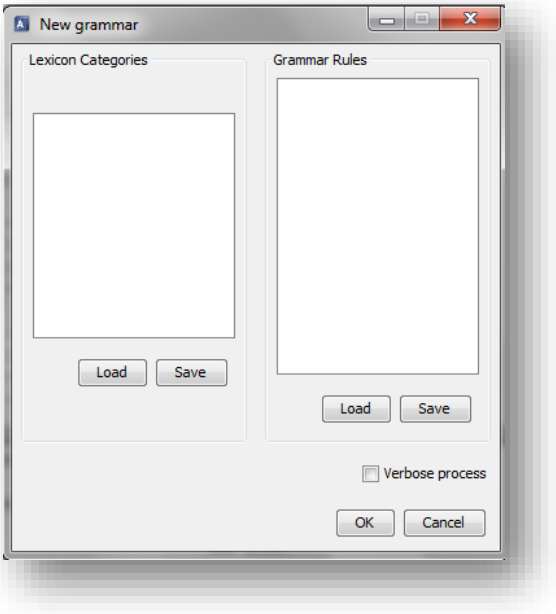


Figure 26: New grammar

The window has the following components:

- **Lexicon categories panel:**
  - **Lexicon categories text area:** show the content of the lexicon categories plain text file with **TXT** extension.
  - **Load button:** load the content of the lexicon categories plain text file with **TXT** extension into the lexicon categories text area.
  - **Save button:** save the content of the lexicon categories text area into a plain text file with **TXT** extension.
- **Grammar rules panel:**
  - **Text box of grammar rules:** show the content of the grammar rules plain text file with **TXT** extension.
  - **Load button:** load the content of the grammar rules plain text file with **TXT** extension into the grammar rules text area.
  - **Save button:** save the content of the grammar rules text area into a plain text file with **TXT** extension.
- **Accept button:** initialize the grammar creation process.
- **Cancel button:** close the window without applying the changes.

In the moment that the new grammar is created, it is not saved until the user selects the save menu option. In the case that the user closes the application without saving it, the last grammar configuration will be loaded.

If the user selects to verbose the grammar creation process, the following window will be displayed:

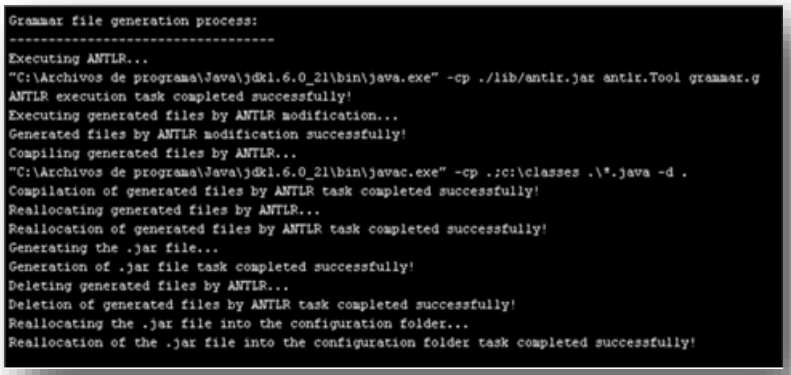


Figure 27: Grammar generation process

3.5.2.2. LOAD GRAMMAR

Load a grammar configuration with **JAR** extension.

3.5.2.3. MODIFY GRAMMAR

Display the same grammar configuration window than the **New Grammar** menu item option but it contains the lexicon categories and grammar rules text areas filled with their file contents:

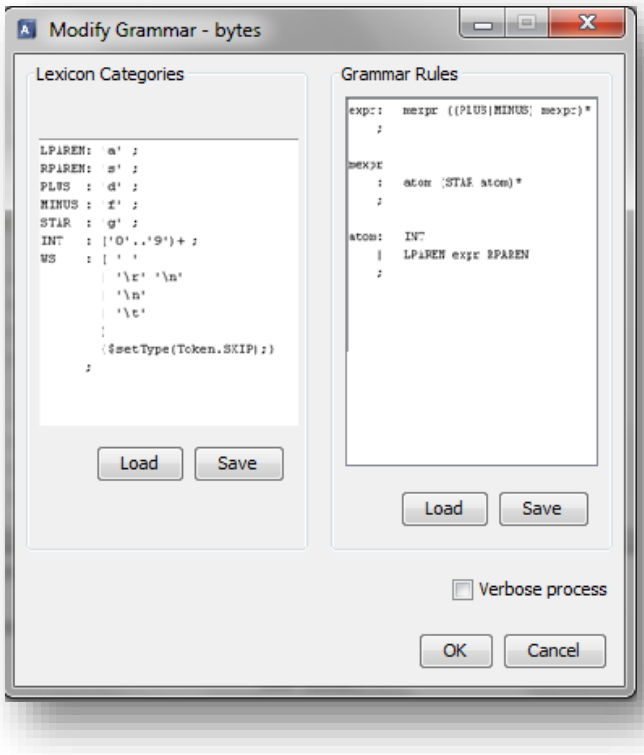


Figure 28: Modify grammar

3.5.2.4. SAVE GRAMMAR

Save the current grammar configuration into a file with **JAR** extension.

3.5.2.5. SAVE GRAMMAR AS

Save the current grammar configuration into a file with **JAR** extension in a different path.

3.5.2.6. CONFIGURE PATHS

For the creation, modification and grammar configurations to hand it is mandatory to define the required tools paths as it was mentioned in the first chapter of the present document.

Display the following window:

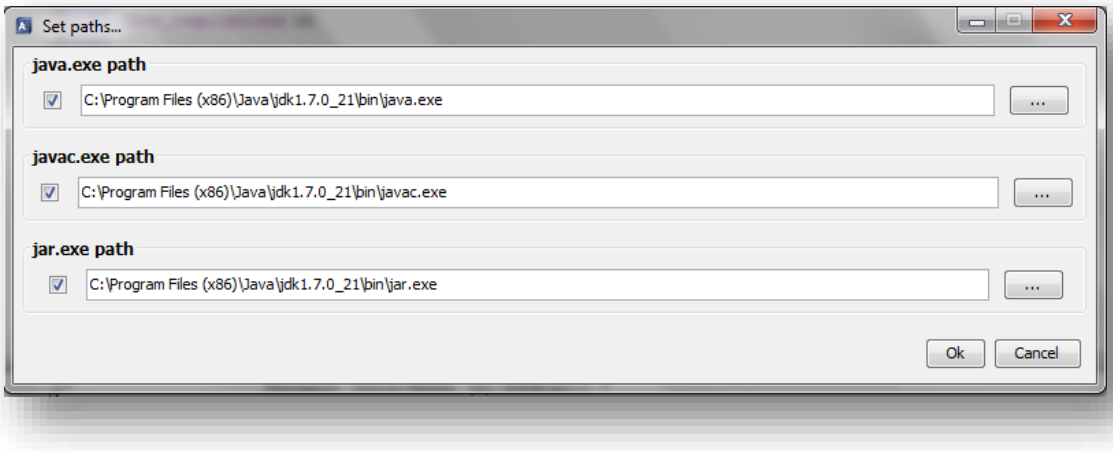


Figure 29: Set paths

In each one of the text fields the user will select the path to each one of the required tools. The window also contains the following components:

- **Check box:** if it is selected the application will use the path selected in the text field that corresponds; if it is disabled the application will use its Operative System CLASSPATH.
- **Explorer buttons:** open a dialog window for the files selection.

3.5.3. COMPILER

The following window will be displayed:

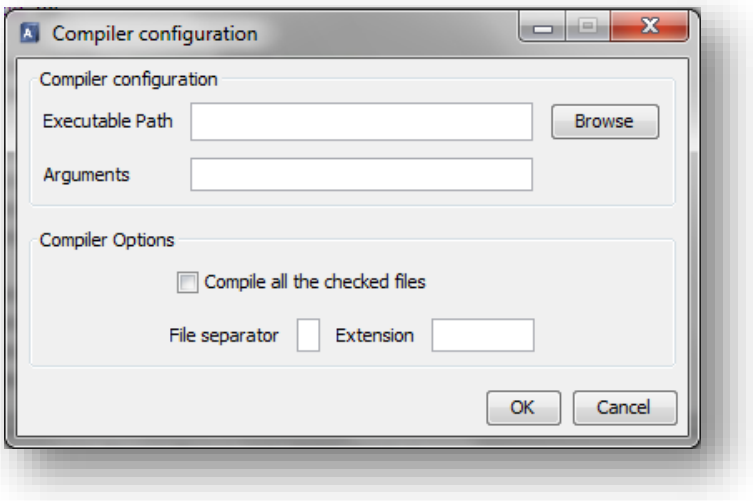


Figure 30: Compiler configuration

The window has the following components:

- **Compiler configuration panel:**
  - **Executable path:** path that contains the compiler executable file.
  - **Compiler arguments:** arguments for the compiler.
- **Compiler options panel:**
  - **Compile all the checked files:** indicate if all the compilable files have to be compiled or not.
  - **File separator:** file separator to separate each one of the files to compile.
  - **Extension:** file extension of the files to compile.
- **Accept button:** apply the changes.
- **Cancel button:** close the window and do not apply the changes.

3.5.4. FILE EDITOR CONFIGURATION

Contain the menu item options for the file editor configuration management:

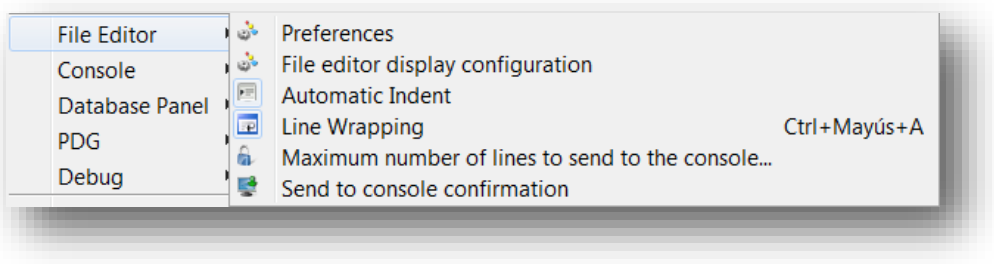


Figure 31: File editor configuration

We also explain how to configure the file editor externally with XML files in *Chapter 16.3.3.* Next, we further detail each one of the previous menu item options:

3.5.4.1. PREFERENCES

Display the following configuration window:

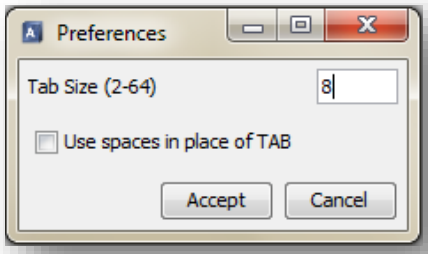


Figure 32: Preferences window

In the Preferences window, the user can configure the following parameters:

- **Tab Size:** by default the size of tabbing is 8 but this can be changed for any value between 2 and 64.
- **Use spaces in place of TAB:** every time the tab key is pressed, it is replaced by the number of spaces which has been specified above.

3.5.4.2. FILE EDITOR DISPLAY OPTIONS CONFIGURATION

Display the following configuration window:

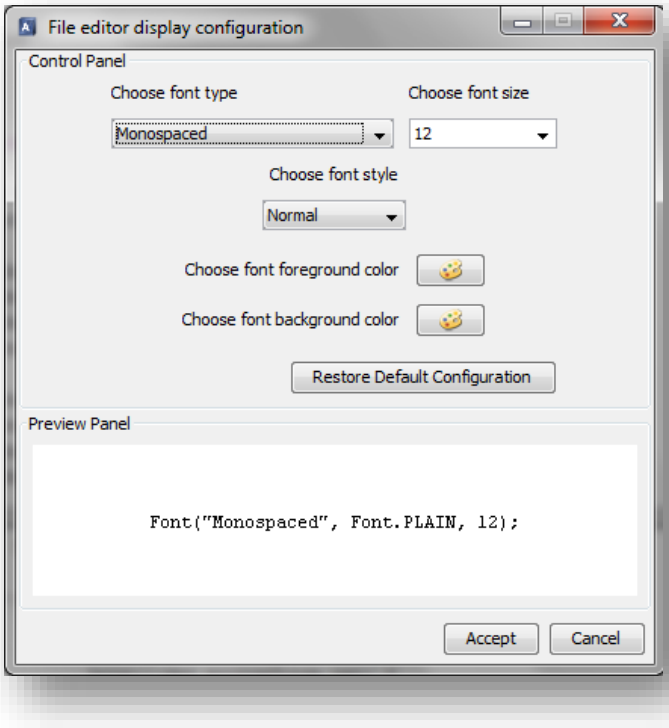


Figure 33: File editor display options

In the configuration window, the user can configure the following parameters:

- **Font type.**

- **Font size.**
- **Font style.**
- **Foreground color.**
- **Background color.**
- **Restore default values:** apply the default configuration:

"Monospaced" font, plain, size of 12, black with white blackground.

3.5.4.3. AUTOMATIC INDENT

Enable or disable the automatic indent in the file editor.

3.5.4.4. LINE WRAPPING

Enable or disable the line wrapping in the file editor.

3.5.4.5. MAXIMUM LINE NUMBER TO SEND TO CONSOLE

Ask to the user for the maximum number of lines to send to the console panel from the active file in the file editor:

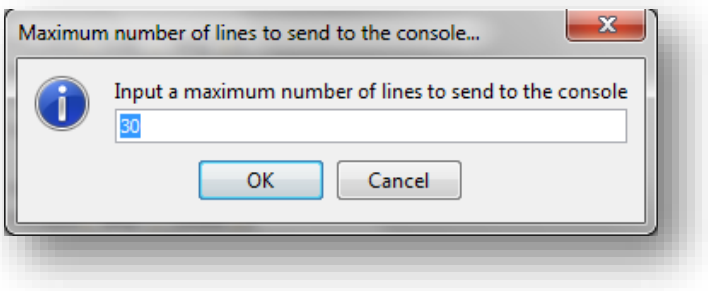
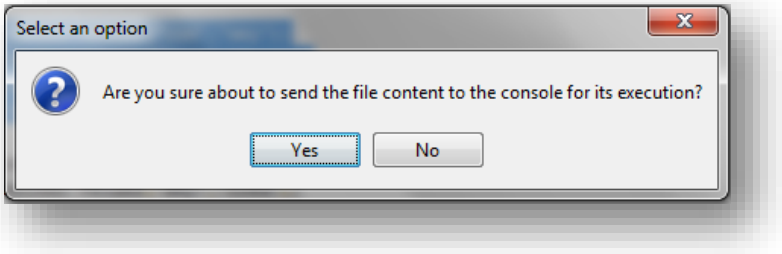


Figure 34: Maximum line number

3.5.4.6. SEND TO CONSOLE CONFIRMATION

If this option is selected, when the user sends contents of the active file in the file editor the application will display the following confirmation message:



If this option is not selected, when the user sends contents of the active file in the file editor the application simply sends the contents to the console panel adding each sent line as a separate command in the console panel command record.

3.5.5. CONSOLE CONFIGURATION

Contain the menu item options for the console panel configuration management:

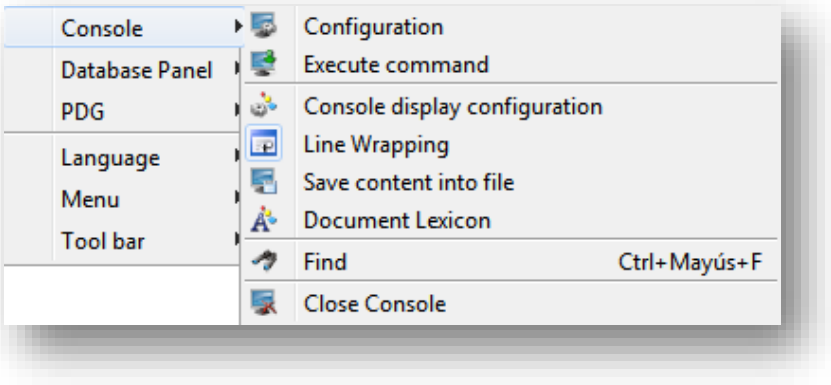


Figure 35: Console menu

We also explain how to configure console panel externally with *XML* files in *Chapter 16.3.4.*

3.5.5.1. CONFIGURATION

Configure the console configurations that are loaded in the console panel:

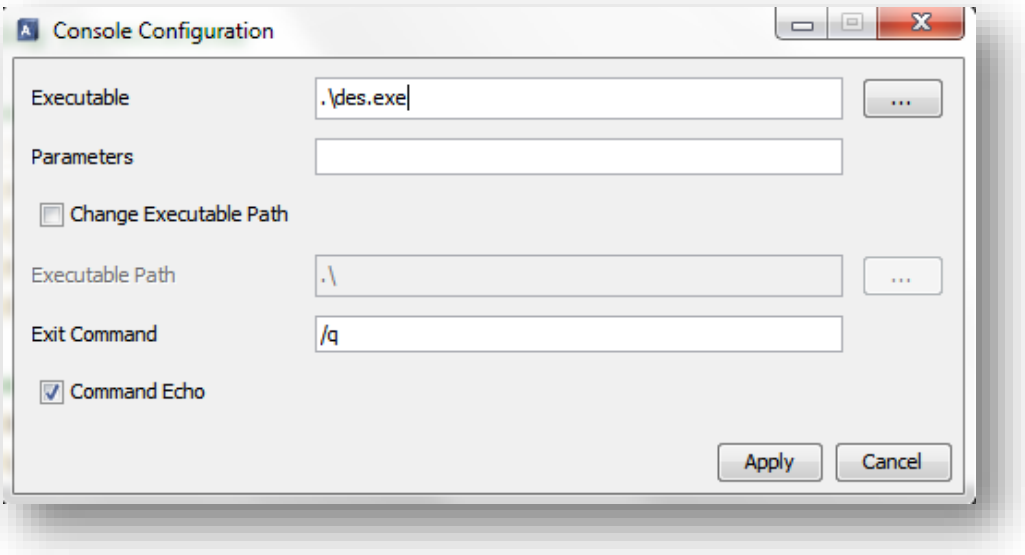


Figure 36: Console configuration

Contain the following components:

- **Executable:** executable file path.
- **Parameters:** console is configured with these parameters.
- **Change executable path:** it is used for especifying a different folder where the executable file is placed.
- **Executable path:** executable file folder.
- **Exit command:** exit command for closing the data stream.
- **Command echo:** indicate if the commands typed in the console panel have to be displayed or not.

3.5.5.2. EXECUTE EXTERNAL COMMAND

Execute a command into a console and displays the result in a separate window that looks like:

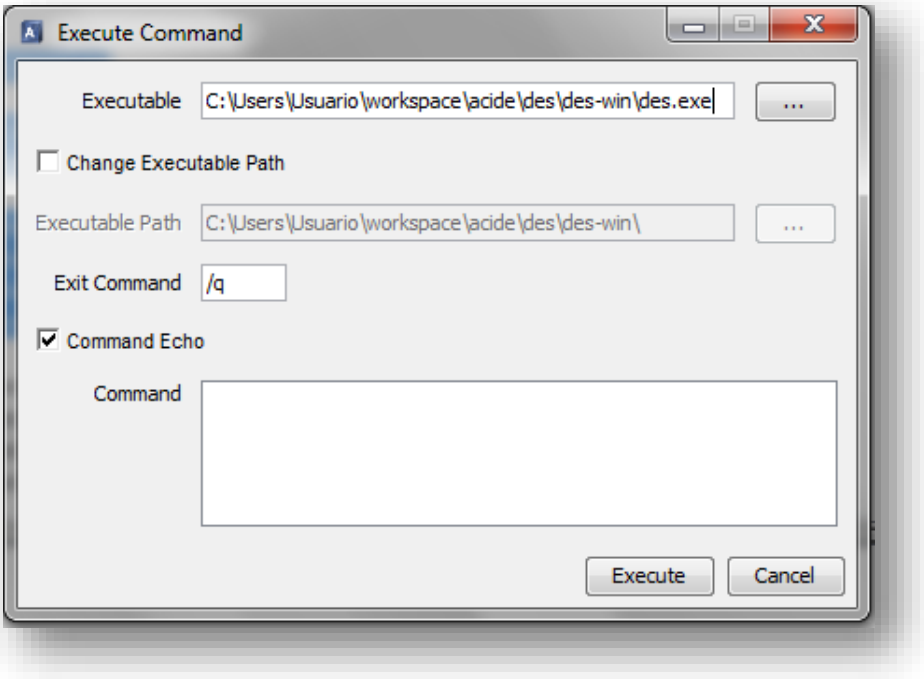


Figure 37: Execute external command

3.5.5.3. CONSOLE DISPLAY CONFIGURATION

Display the following configuration window:

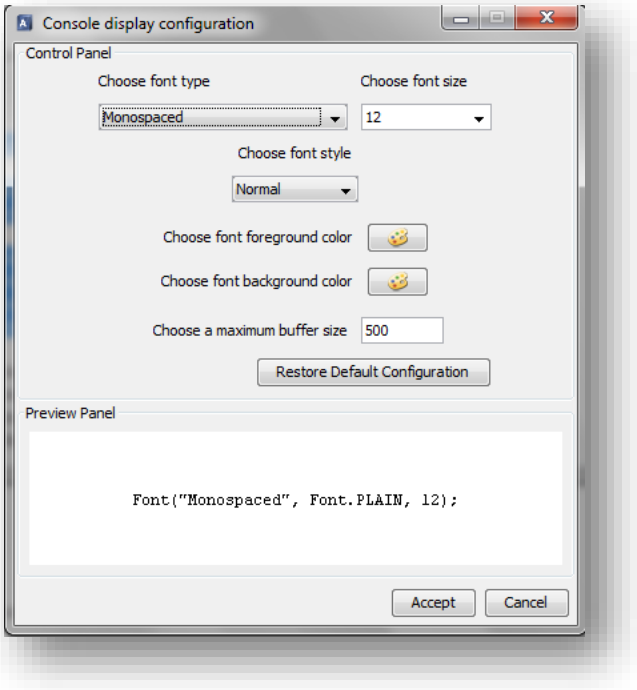


Figure 38: Console display configuration

The user can select:

- **Font type.**
- **Font size.**
- **Font color.**
- **Background color.**
- **Maximum buffer size:** specify the maximum number of lines that are displayed in the console panel.
- **Restore default configuration:** apply the default configuration for the console panel:

"Monospaced" font, plain, size of 12, black with white background

3.5.5.4. LINE WRAPPING

Enable and disable the console line wrapping.

3.5.5.5. SAVE CONTENT INTO FILE

Save the console content into a file.

3.5.5.6. DOCUMENT LEXICON

Load a lexicon configuration with **XML** extension into the console panel.

3.5.5.7. FIND

Display the search text window for the console panel:

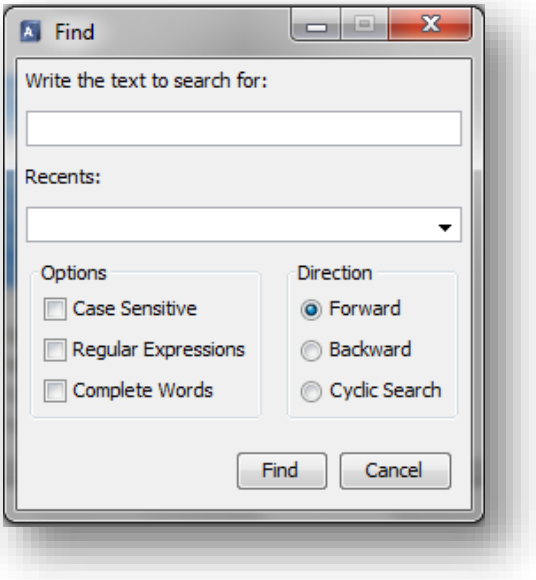


Figure 39: Console search window

Then we proceed to describe each component of the window:

- **Text box:** Here is where user enters the search text.
- **Recents:** This combo menu displays a list which contains all the recent searches that have been executed before. When user selects one, this appears in the Text box.
- **Options:**
  - **Case sensitive:** this option is used to search for strings without having or taking into account the Upper / Lowercase.
  - **Regular expressions:** regular expressions search associated with a search pattern. More information about Regular Expressions on *Chapter 17*.
  - **Whole words:** find whole words only.
- **Direction:**

- **Forward:** search from the current caret position to the end of the file in the source file editor.
- **Backward:** search from the current caret position to the beginning of the file in the source file editor.
- **Cyclic:** search from the current caret position to the end of the file in the source file editor, and star from the beginning until the starting position.

3.5.5.8. CLOSE CONSOLE

Close the active console in the console panel.

3.5.5.9. RESET CONSOLE

Only available in the *popup menu* of the console panel. Reset the active console in the console panel.

3.5.5.10. CLEAR CONSOLE BUFFER

Only available in the *popup menu* of the console panel. Clear the console panel content and leave only the last line of the previous buffer content.

3.5.6. DATABASE PANEL CONFIGURATION

Contain the menu item options for the database panel configuration management:

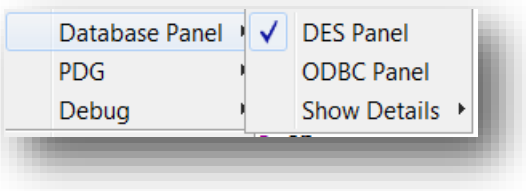


Figure 40: Database panel menu

Then we proceed to describe each component of the menu:

3.5.6.1. DES PANEL

When this item is selected, the database panel in the left lower corner is connected with *DES*.

3.5.6.2. ODBC PANEL

When this item is selected, the database panel in the left lower corner is connected with *ODBC*.

3.5.6.3. SHOW DETAILS

Contain the option menu items to customize the visualization of the tables and views in the Database Panel.

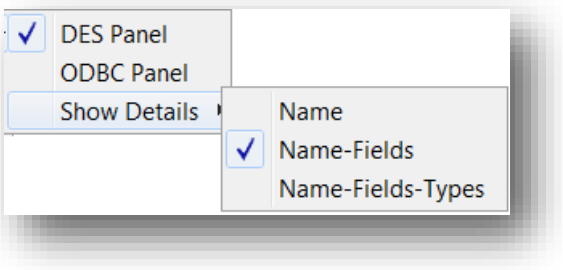


Figure 41: Show Details Menu

3.5.6.3.1. NAME

Show only the name of tables and views.

3.5.6.3.2. NAME FIELDS

Show the name and columns of tables and views.

3.5.6.3.3. NAME FIELDS TYPES

Show the name, columns and type of each column of tables and views.

3.5.7. GRAPH PANEL CONFIGURATION

Contain the configuration menu options for the graph panel:

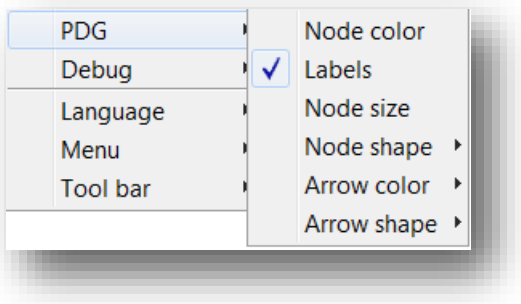


Figure 42 : Graph Panel Configuration menu

3.5.7.1. NODE COLOR

Show a window where the user can choose the desired color of the nodes.

3.5.7.2. SHOW LABELS

Show or hides the labels of the nodes in the graph.

3.5.7.3. NODE SHAPE

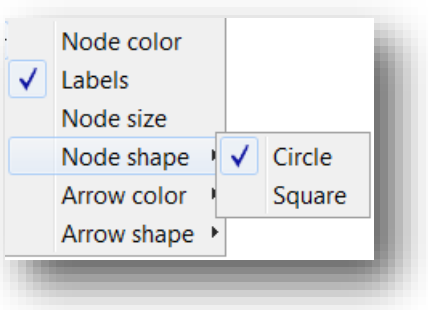


Figure 43: Node shape menu

Show the list of available node shapes that can be used on the PDG graph.

3.5.7.4. ARROW COLOR

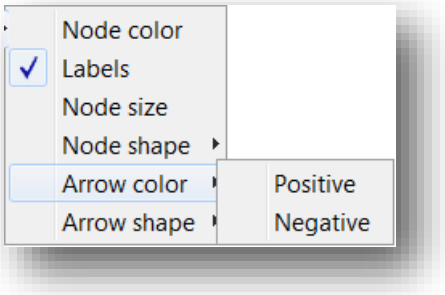


Figure 44: Arrow color menu

Show a window, where the user can choose the color of the arrows on the PDG.

3.5.7.5. ARROW SHAPE

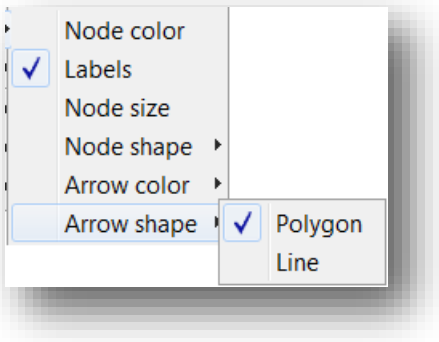


Figure 45: Arrow shape menu

Show the list of available points of arrow for the PDG.

3.5.8. DEBUG PANEL CONFIGURATION

Contain the configuration menu options for the graph panel:

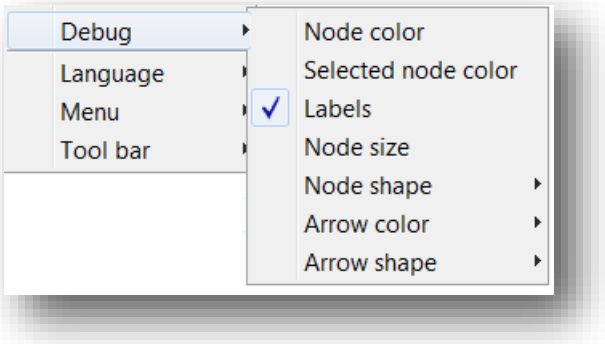


Figure 46 : Debug Panel Configuration menu

3.5.8.1. NODE COLOR

Show a window where the user can choose the desired color of the nodes.

3.5.8.2. SELECTED NODE COLOR

Show a window where the user can choose the desired color of the selected node.

3.5.8.3. SHOW LABELS

Show or hides the labels of the nodes in the graph.

3.5.8.4. NODE SHAPE

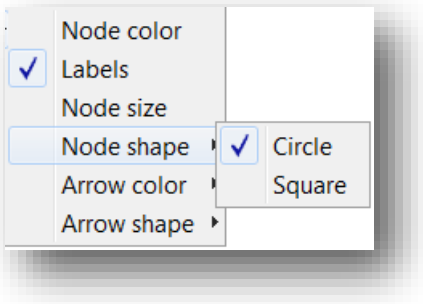


Figure 47: Node shape menu

Show the list of available node shapes that can be used on the Debug graph.

3.5.8.5. ARROW COLOR

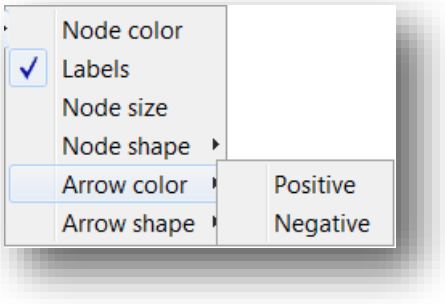


Figure 48: Arrow color menu

Show a window, where the user can choose the color of the arrows on the Debug.

3.5.8.6. ARROW SHAPE

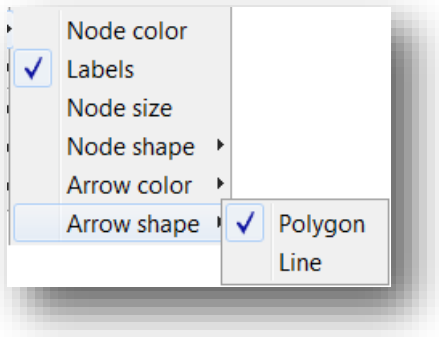


Figure 49: Arrow shape menu

Show the list of available points of arrow for the Debug.

3.5.9. LANGUAGE CONFIGURATION

Show the available language list of the application:

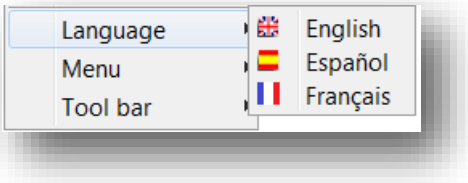


Figure 50: Language configuration menu

In this case, the user can choose only between the languages defined in the language folder.

3.5.10. MENU CONFIGURATION

Contain the menu item options for the menu configuration management:

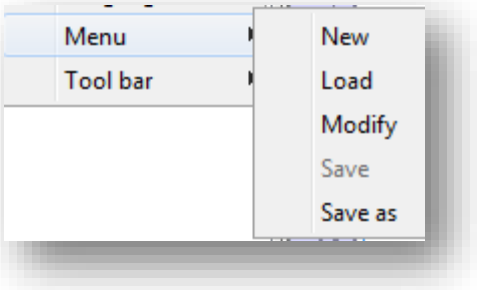


Figure 51: Menu configuration menu

We also explain how to configure menu externally with *XML* files in *Chapter 16.3.1.* Next, we further describe each one of the previous menu item options:

3.5.10.1. NEW

Display the following configuration window:

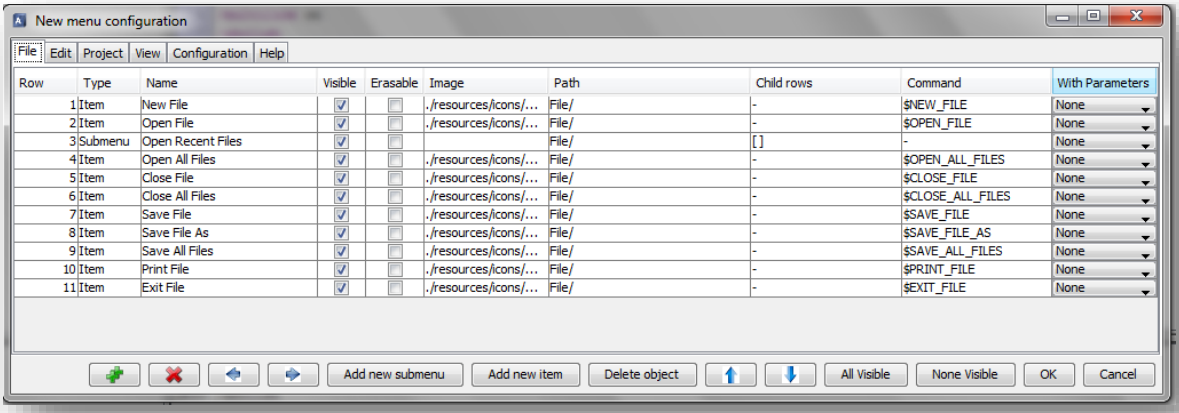


Figure 52: New menu

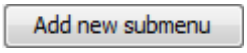
Display a list of tabs with the names of the menus in the *Menu bar*. For each tab there is a grid with attributes of its menu objects.

The user can edit directly in the grid the attributes he wants to change, except some that are not editable. The value it is not assigned until user hits *ENTER* or changes to other attribute or object. Next, we further describe each one of the menu objects options:

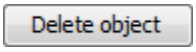
- **Row:** the number of the row. It is not editable.
- **Type:** the type of the menu object in this row. It can ben *Item* or *Submenu*. It is not editable, this value is assigned when the object is created.
- **Name:** the name of the menu object. It is editable.
- **Visible:** this value sets if the menu object is visible in the *Menu bar* or not.
- **Erasable:** this value indicates if this menu object is a default menu object or not. It is not editable. The menu objects with erasable value to false are default menu objects. These objects have to be always in the *Menu bar* configuration, altough they can be not visible. When the application builds the menu, it checks if all the default menu objects exit in the configuration. If any menu object does not exit, the application creates it at the end of its submenu. It can exits only one of each default menu object. The application will delete the rest.
- **Image:** the path of the image icon of the menu item. The image icons belong only to menu items.
- **Path:** indicate the location of the menu object inside the menu which contains it.
- **Child rows:** it is only for menu submenus. It indicates the number of row of their childern.
- **Command:** it is only for menu items. It sets the command that the menu item will run. The commands that start with a *"$"* sign are intern commands for *ACIDE – A Configurable IDE* and they are explained on *Chapter 0*. Commands that not start with *"$"* are sent to console.
- **With parameters:** it is only for menu items. Indicates the type of parameter which the command needs to run.

3.5.10.1.1. BUTTONS PANEL

Next, we further describe each of the buttons of the configuration window:

-  **Add new menu** : It will display a window where user can type down the name of the new menu he wants to insert. It will be inserted at the end of the menus list.
-  **Delete menu:** It will delete the present menu before a confirmation message. The default menu can be deleted.
-  **Move menu to the left:** move the present menu to the left in the menus list.
-  **Move menu to the right:** move the present menu to the left in the menus list.
- 

: add a new submenu to the menu selected. If there is a menu submenu selected, the new submenu will be inserted inside it. If there is a menu item selected, the new submenu will be inserted after it. In other case, the new submenu will be inserted at the end of the list of the root menu.
- 

: add a new menu item to the menu selected. If there is a menu submenu selected, the new item will be inserted inside it. If there is a menu item selected, the new item will be inserted after it. In other case, the new item will be inserted at the end of the list of the root menu.
- 

: delete the selected object after a confirmation message. The objects that are not erasable can not be deleted.
-  **Move object to up**:move to up the selected menu object.
-  **Move object to down**: move down the selected menu object.
- 

: set as visible all the menu objects of the *Menu Bar*.

- None Visible: set as no visible all the menu objects of the *Menu Bar*. The menu objects related to menu configuration always have to be visible.
- OK: Apply the changes and closes the window.
- Cancel: Close the window without applying the changes.

3.5.10.1.2. POPUP MENU

The *popup menu* of menu object is as follows:

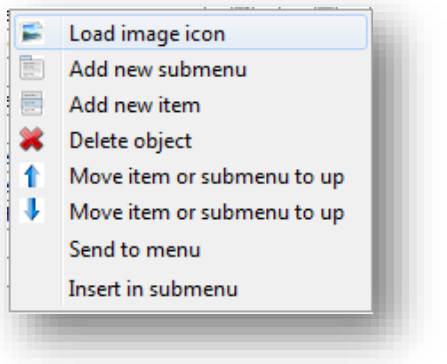


Figure 53: Object menu popup menu

Next, we further describe each of the options:

- **Load image icon**: it will display a load window where user can select the image he wants to set as icon of the menu object.
- **Add new submenu**: add a new submenu to the menu selected. If there is a menu submenu selected, the new submenu will be inserted inside it. If there is a menu item selected, the new submenu will be inserted after it. In other case, the new submenu will be inserted at the end of the list of the root menu.
- **Add new item**: add a new menu item to the menu selected. If there is a menu submenu selected, the new item will be inserted inside it. If there is a menu item selected, the new item will be inserted after it. In other case, the new item will be inserted at the end of the list of the root menu.
- **Delete object**: delete the selected object after a confirmation message. The objects that are not erasable can not be deleted.
- **Move item or submenu to up**: move to up the selected menu object.

- **Move item or submenu to down**: move down the selected menu object.
- **Send to menu**: display a window with a list of menus where user can send the selected menu object.
- **Insert in submenu**:display a window with a list of submenus inside the present menu where user can insert the selected menu object.

3.5.10.1.3. KEY NAVEGATION

- **Up arrow:** select previous object.
- **Down arrow:** select next object.
- **Ctrl + Home:** select the first object.
- **Ctrl + End:** select the last object.
- **Tab:** select next attribute.
- **Tab + Shift:** select previous attribute.
- **Esc:** deselect the selected object.

3.5.10.2. LOAD

Load a menu configuration with **XML** extension.

3.5.10.3. MODIFY

Selecting this option displays the following configuration window, similar to creating a new configuration window, but with corresponding options of the loaded menu and with the name of the configuration in the window title:

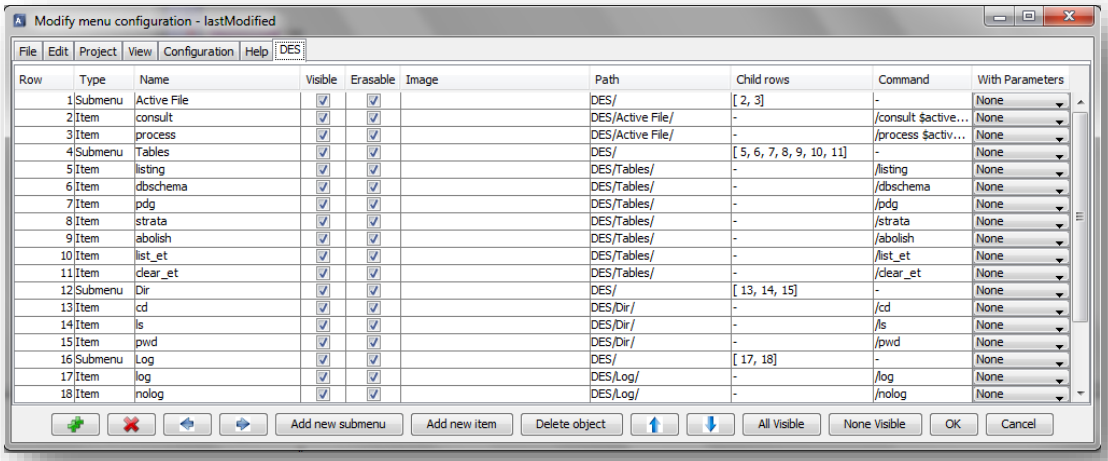


Figure 54: Modify menu

Its performance is equal to the new menu window explained on *Chapter 3.5.10.1*.

3.5.10.4. SAVE

Save the current menu configuration into a menu configuration file with **XML** extension.

3.5.10.5. SAVE AS

Save the current menu configuration into a menu configuration file with **XML** extension in a different path.

3.5.11. TOOLBAR CONFIGURATION

It contains the menu item options for the tool bar configuration management:

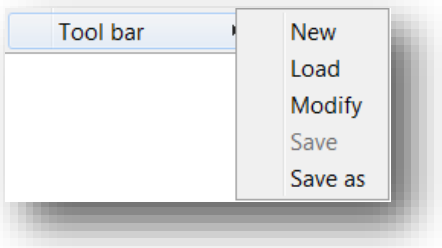


Figure 55: Tool Bar configuration menu

We also explain how to configure toolbar externally with *.toolbarConfig* files in *Chapter 16.3.2*

3.5.11.1. NEW

Display the following configuration window:

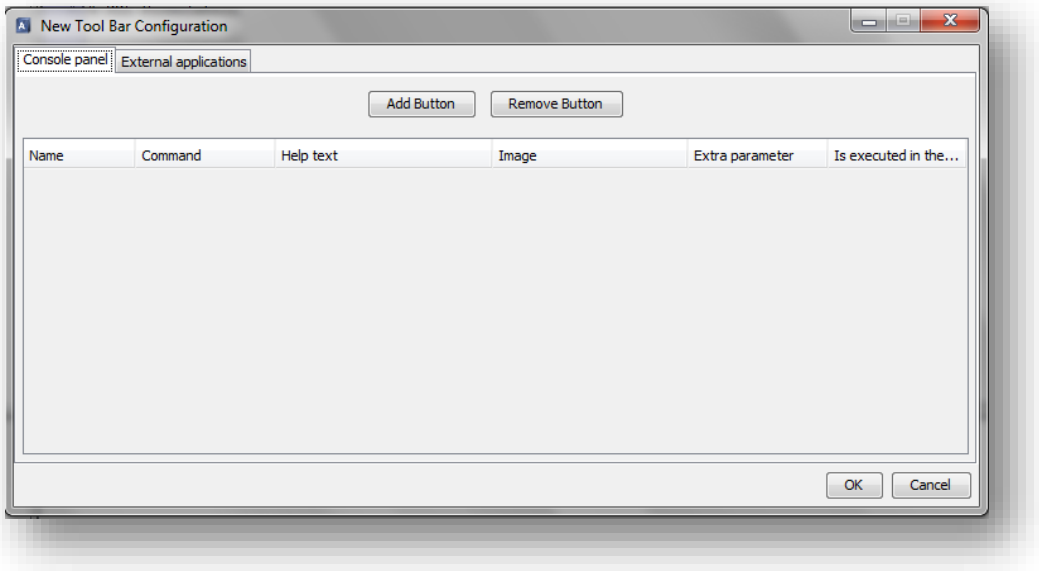


Figure 56: New tool bar

The window has two different panels:

- **Console panel:** define the commands related to the console panel tool bar that are executed in the console panel.
- **External applications panel:** define the commands related to the external applications tool bar that are executed out of the aplication.

In each one of the panels, the user can do the following operations:

- **Add button:** add a new command to the command list in the table.
- **Remove button:** remove the selected command from the command list.
- **Direct edition on the tables:** the user can modify the commands by editing directly on the table. However, the changes will not be applied until the focus changes or the user presses down the *ENTER* key.

In the *console panel* tab the table contains the following parameters:

- **Name:** text to display in the button. If this field is empty the application will assign it a number as name by default.

- **Command:** command itself. It admits the insertion of *ACIDE – A Configurable IDE special variables* that are further detailed in the *Chapter 0* of the present document.
- **Help text:** hint text of the button.
- **Image:** image for the button which can be selected by the option available in the *popupmenu* of the column.
- **Extra parameter:** show a combo box with the following options: *NONE, TEXT, FILE, DIRECTORY.* Each one of the previous options will ask the user for the selected type with different dialog windows.
- **Is executed in the OS console:** indicate if the command is executed in the Operative System console or in the loaded console in the console panel.

In the *external applications panel* tab the table contains the following parameters:

- **Name:** text to display in the button. If this field is empty the application will assign it a number as name by default.
- **Executable path:** executable path of the command to execute. It admits the insertion of *ACIDE – A Configurable IDE special variables* that are further detailed in *Chapter 0* of the present document.
- **Help text:** hint text of the button.
- **Image:** image for the button which can be selected by the option available in the *popup menu* of the column.

The tool bar configuration files have *toolbarConfig* extension.

3.5.11.2. LOAD

Load a tool bar configuration with *toolbarConfig* extension.

3.5.11.3. MODIFY

Display the following configuration window:

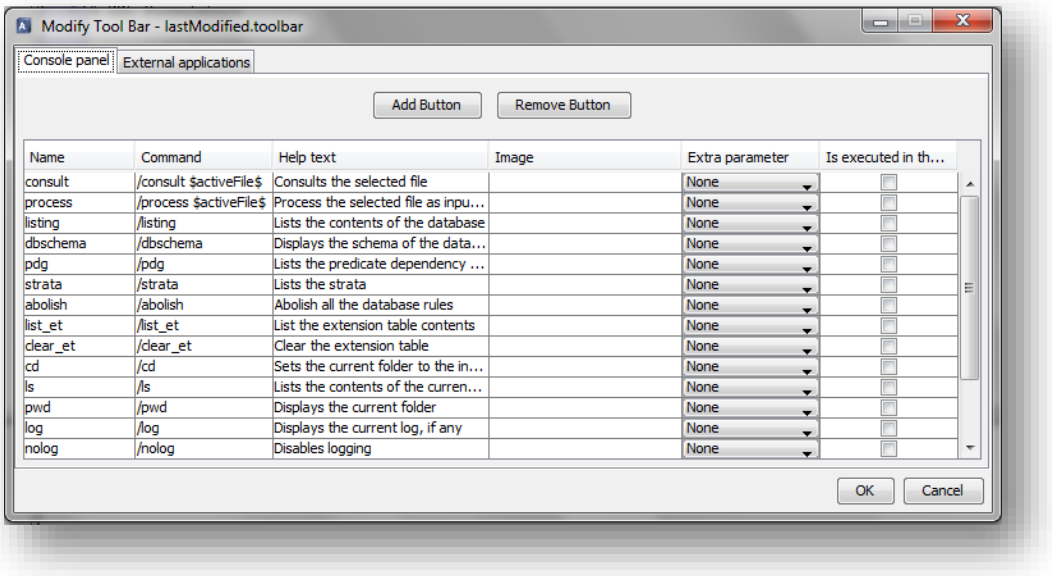


Figure 57: Modify tool bar

Contain the same options than the configuration window displayed by the *Configuration/Menu/New.*

In this case, the window displays the current tool bar configuration loaded in the tables and also with a different window title which contains the name of the current configuration to modify.

3.5.11.4. SAVE

Save the current tool bar configuration into a tool bar configuration file with ***toolbarConfig*** extension.

3.5.11.5. SAVE AS

Save the current tool bar configuration into a tool bar configuration file with ***toolbarConfig*** extension and with a different path.

3.6. HELP MENU

Contain the following menu items:

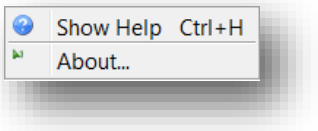


Figure 58: Help menu

Next, the previous menu options are further explained:

3.6.1. SHOW HELP

Link directly to the present document.

3.6.2. ABOUT US

Display the following window with some extra information about the application:

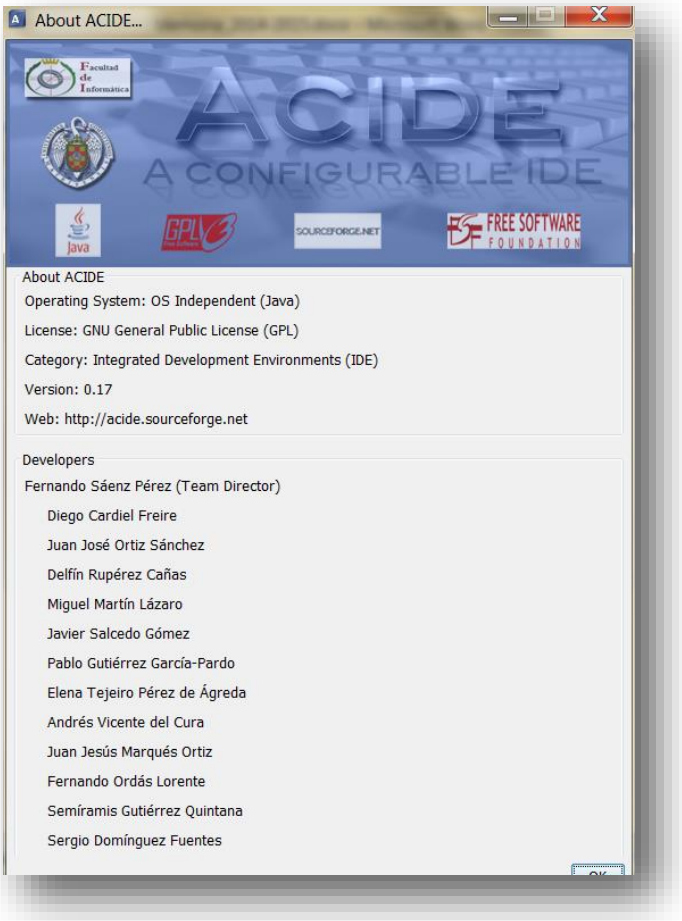


Figure 59: About us window

3.7. INSERTED SUBMENUS

As explained in *chapters 3.5.10* and *16.3.1* , user can insert new submenus in the tool bar. Then, inside these submenus new inserted submenus and menu items can be defined. For each inserted submenu the attributes are:

- **Name:** the name of the submenu.
- **Visible:** define if the submenu is visible or not in the application.
- **Erasable:** define if the submenu is a default submenu (not erasable) or not (is erasable). The value of this attribute can not be edited.
- **List:** list of all the submenus and menu items that the submenu contains.
- **Image:** for submenus the value of this attribute is empty.

An example of an inserted submenu is:

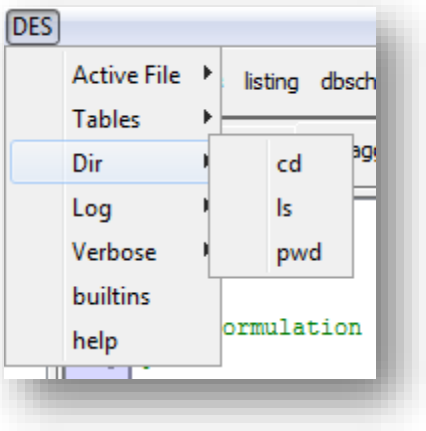


Figure 60: Example of inserted submenu

In this example we can see an inserted submenu called *DES* and defined in the menu bar.

3.8. INSERTED MENU ITEMS

As explained in *chapters 3.5.10* and *16.3.1* , user can insert new menu items in the tool bar. For each inserted menu item the attributes are:

- **Name:** the name of the menu item.
- **Visible:** define if the menu item is visible or not in the application.
- **Erasable:** define if the menu item is a default menu item (not erasable) or not (is erasable). The value of this attribute can not be edited.
- **Image:** define the path of the image which is the icon of the menu item.
- **Command:** define the command that is sent to console when this menu item is clicked.
- **Parameter:** define the type of parameter that the command of this menu item needs: *None*, *Text*, *File* or *Directory.*

A example of inserted menu items can be seen in *Chapter 3.7* of the present document.

4. PROJECT BROWSER PANEL

In the project browser panel are displayed the folders and files of the active project. The *main files* appear with a blue circle beside, the *compilable files* with a green circle and the rest with a grey circle:

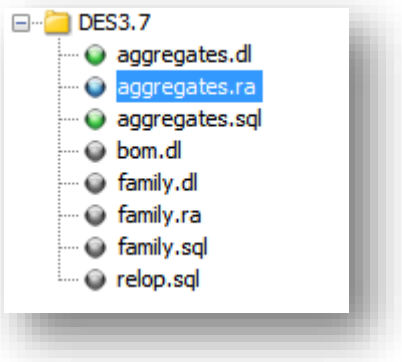


Figure 61: Project browser panel

The *popup menu* of each file and folder is as follow:

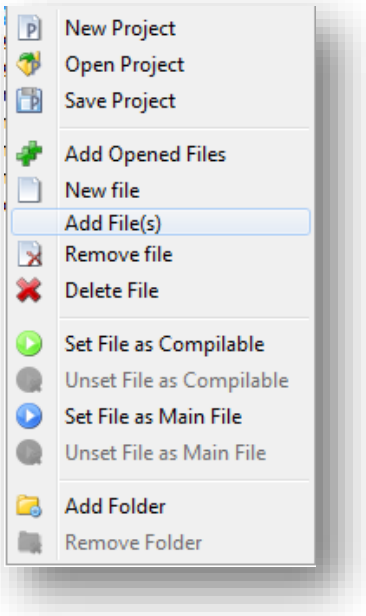


Figure 62: Project browser popup menu

All these options have been explained before on *Chapter 3.3.*

5. FILE EDITOR PANEL

In the file editor panel are displayed all the opened files by tabs. Each tab is named by the name of the file it contains:

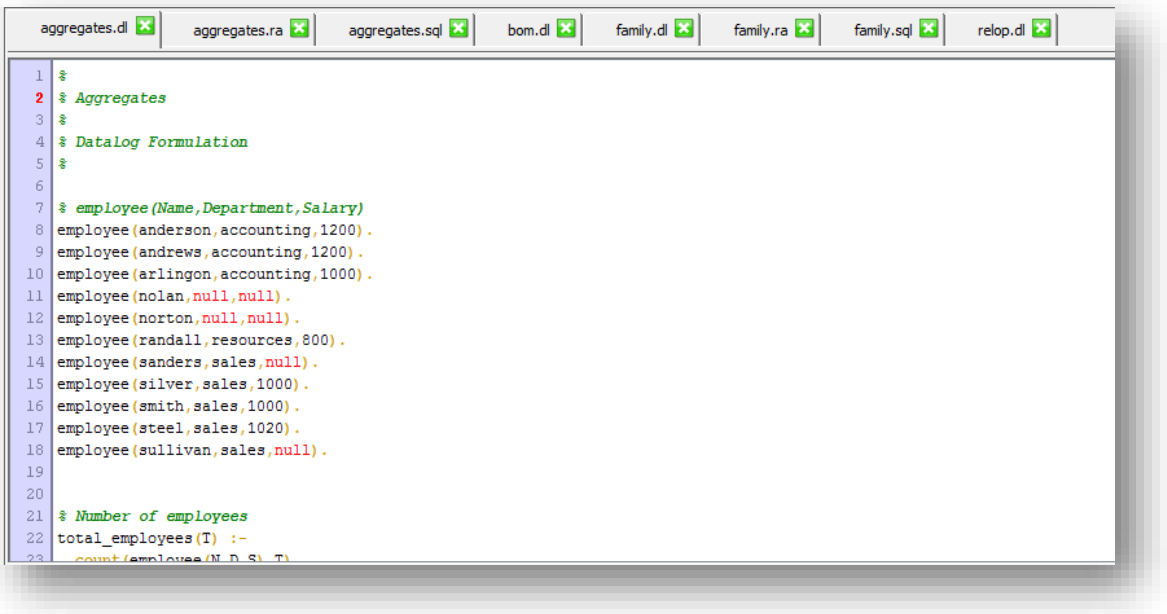
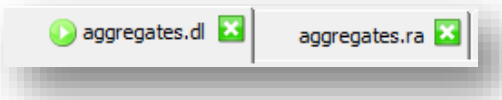


Figure 63: File editor panel

When a file is modified and it is not saved yet, its tab is as follows:

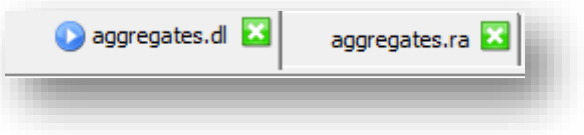
with a red cross beside the title of the tab.

When a file is set as compilable file, its tab is as follows:



with a green play sign beside the title of the tab.

And finally, when a file is set as main file, its tab is as follows:



With a blue play sign beside the title of the tab.

The *popup menu* is as follow:

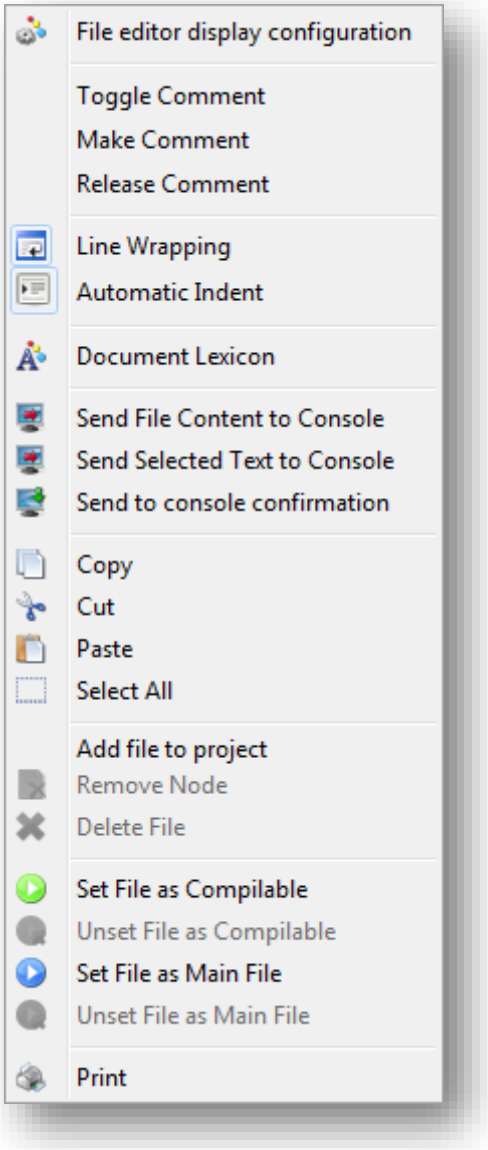


Figure 64: File editor popup menu

All these options have been explained before on *Chapter* 3.

The available accessibility shortcuts for File Editor will be further explained in *Chapter 13*.

6. TOOL BAR

In the toolbar are displayed some items related with files and projects, commands defined by user to be run in console and commands defined by user to run external applications:

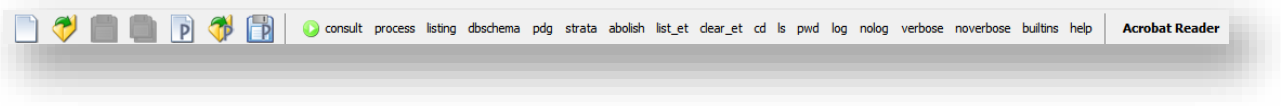


Figure 65: Tool bar

Next, we further describe each one of the previous components:

-  : Creates a new file.
-  : Opens a file.
-  : Saves current file.
-  : Saves all opened files.
-  : Creates a new project.
-  :Opens a project.
-  : Saves current project.
- The following items are commands configured by user that run commands on console (explained on *chapters 3.5.11* and *16.3.2).*
-  : Sends file content to console.
- The following items are commands configured by user that run external applications (explained on *chapters 3.5.11* and *16.3.2).*

7. CONSOLE PANEL

At console panel the user can work with the console he connects to *ACIDE – A Configurable IDE* (explained on *Chapter 3.5.5*). An example of console panel connected with *DES*:

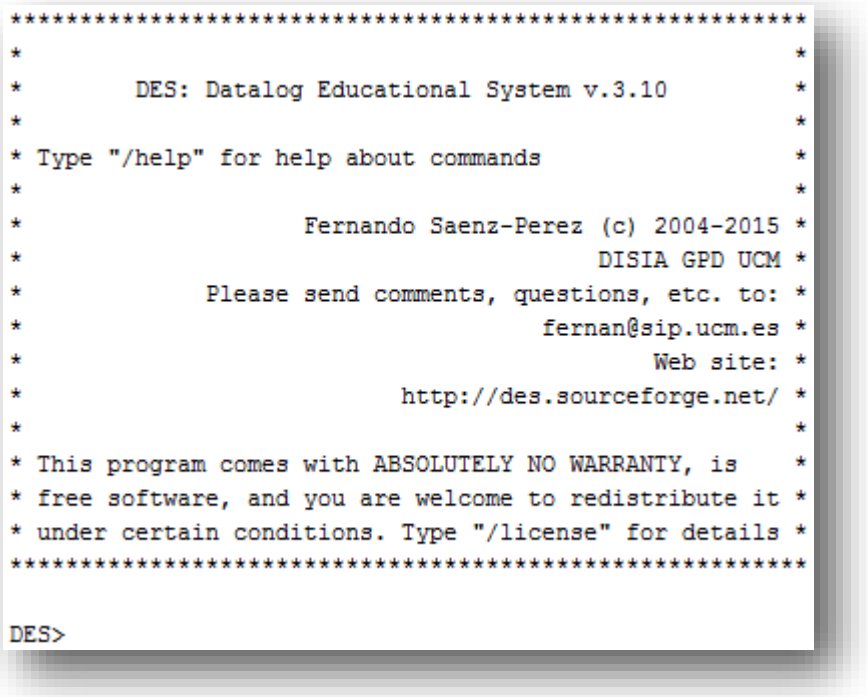


Figure 66: Console panel

The *popup menu* is as follows:

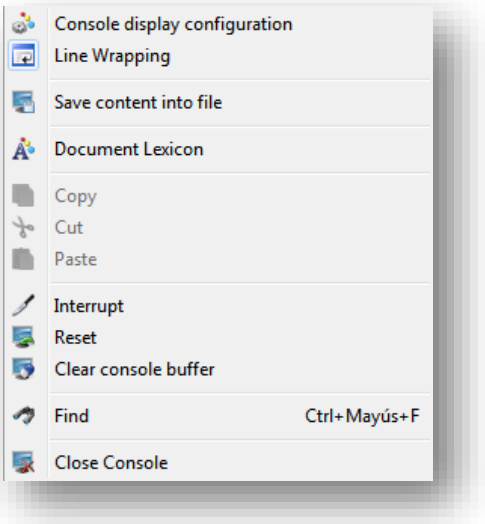


Figure 67: Console panel popup menu

All the options have been explained before in *Chapter 3.*

The user can send commands to the console in different ways. As explained before, user can send the selected text or the content of a file to the sell. Also he can configure the toolbar with buttons which send commands to console. A new performance of this version is that user can configure the *Menu Bar* to build buttons that send commands to console in the same way that the toolbar buttons. The default buttons of *ACIDE – A Configurable IDE* send special commands that will be further explained in *Chapter 0*.

8. DATABASE PANEL

The database panel shows the metadata of your computer's databases on the lower left corner of the screen.

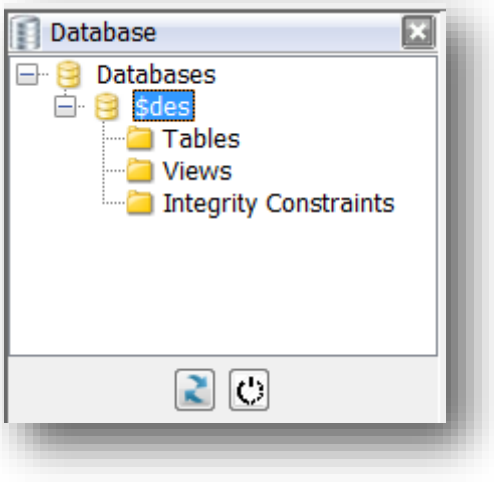


Figure 68: Database panel

This panel can be connected with the *DES* or *ODBC* connections of your computer. The user can choose the connection in the *configuration* menu, submenu *database panel*. Nodes can be expanded with double click or with one click on the node and one more on the *"+"* button. The panel can be refreshing with the refresh button  and ha can be reset whit the reset button  .

8.1. DATABASES NODE

This is the root node of the database panel, below it all the databases connected will be showed.

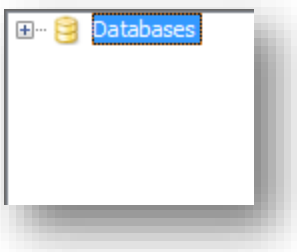


Figure 69: Databases node

The *popup menu* of this node is the next:

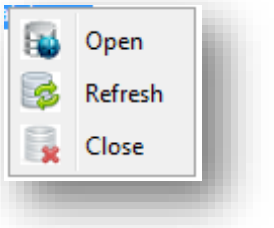


Figure 70: Databases node popup menu

Next we further detail each one of the components of the *popup menu:*

8.1.1. OPEN

With this option user can connect the panel with other database. The following window is displayed:

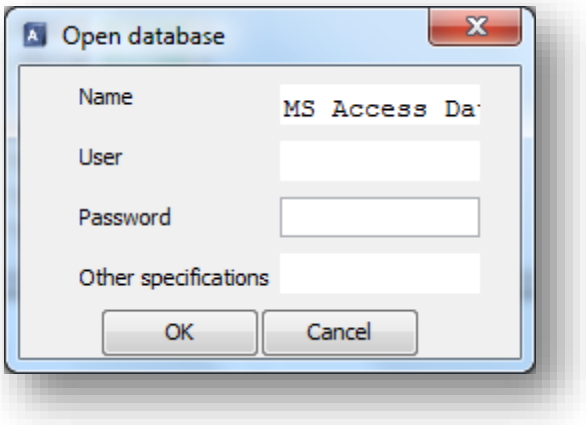


Figure 71: Open database

8.1.2. REFRESH

All the *database panel* will be refreshed and user will see all the modifications made with it.

8.1.3. CLOSE

The *database panel* will be closed.

8.2. DATABASE NODE

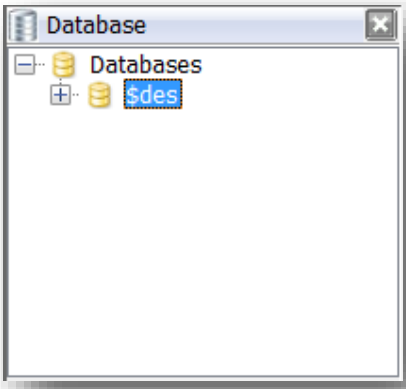


Figure 72: Database node

All the databases opened on this panel are showed in this level of the tree. With the contextual menu user can do the following actions:

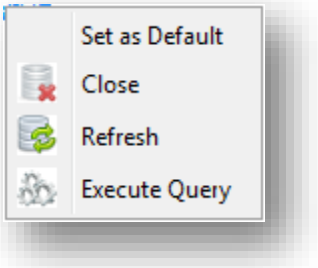


Figure 73: Database node popup menu

8.2.1. SET AS DEFAULT

If the console is connected to *DES*, this option will set this database as the database in use for the following commands.

8.2.2. CLOSE

It will close the connection with the database.

8.2.3. REFRESH

It will refresh the database node.

8.2.4. EXECUTE QUERY

Display a window with a text field to input queries in *SQL* in the database.

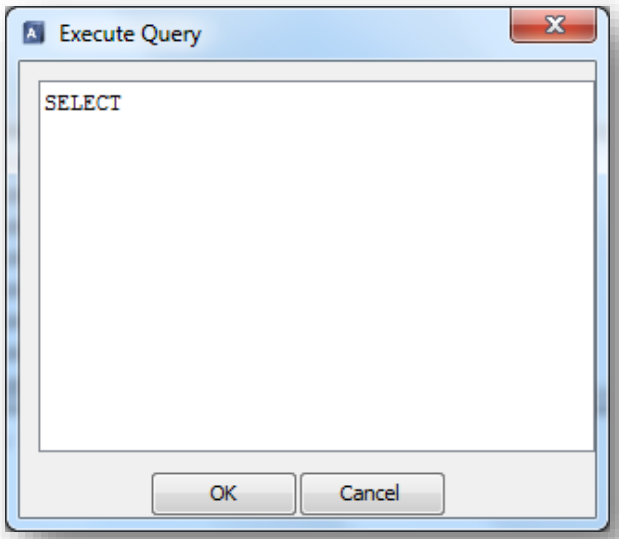


Figure 74: Execute query

When user clicks on *"OK"* button the results are showed on the *Data View. Data View* will be further explained in *Chapter 8.4.5*.

Expanding this node there will be three folders below it: *tables, views,* and *integrity constraints.*

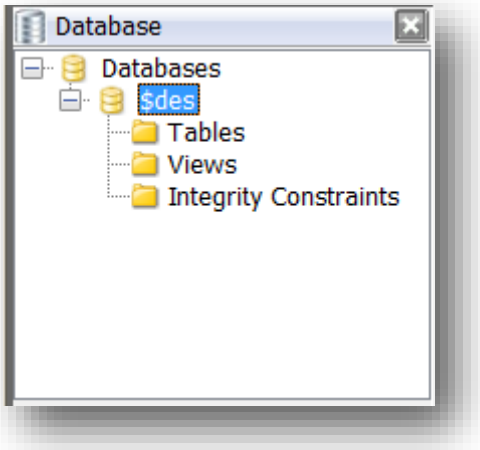


Figure 75: Expanding database node

8.3. TABLES NODE

The children of this node will be all the tables of this database. Its *popup menu* is:

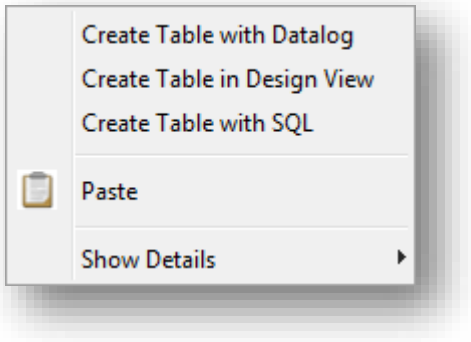


Figure 76: Tables node popup menu

8.3.1. CREATE TABLE WITH DATALOG

This option is only enabled if the panel is connected with *DES.* The user can create a table with a *Datalog* command in a window similar to the window of *Execute query* action (*Chapter 0*).

8.3.2. CREATE TABLE WITH DESIGN VIEW

With this option the user can create a new table usign a design table with four columns to choose: *name of the field, type, primary key* and *not null:*

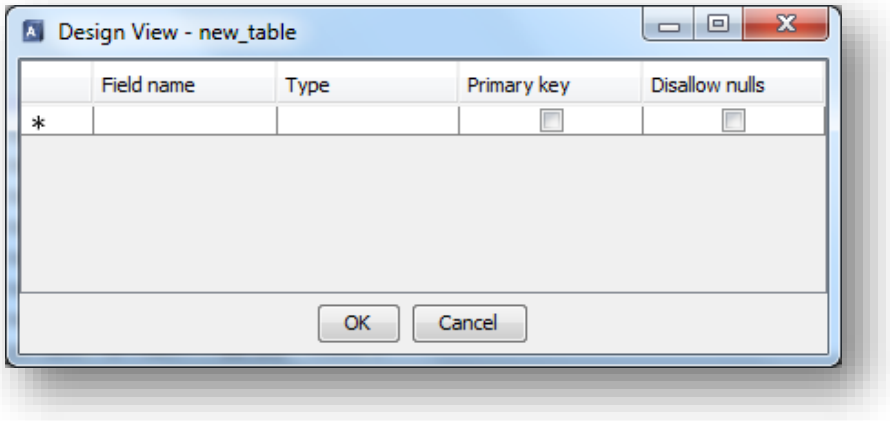


Figure 77: New table

With the *"*"* new rows can be inserted in the design table. If you want to make a field part of the primary key you have to mark the checkbox of that column. This option make impossible to mark the *Disallow nulls* option.

8.3.3. CREATE TABLE WITH SQL

It displays a window like the *"Execute query"* (*Chapter 0*) window where the use can create a table with *SQL* commands.

8.3.4. PASTE

This option will create a new table with the schema or with the schema and data that the user has copied before from another table of the panel.

8.3.5. SHOW DETAILS

This menu allows the user to customize the visualization of table nodes. The selection is also performed on the view nodes.

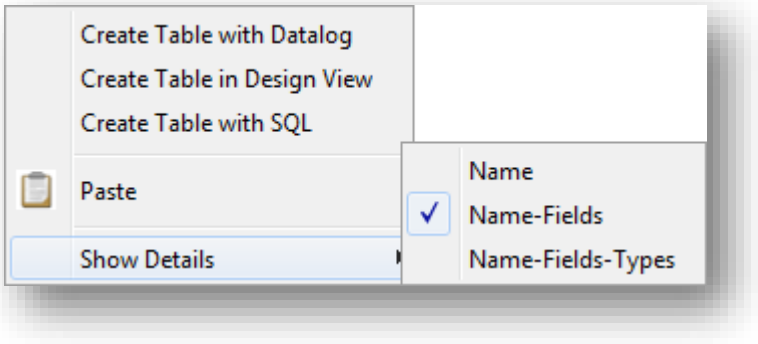


Figure 78: Show Details Menu Tables Node

8.4. TABLE NODE

If the panel is connected with *DES* nodes of this type will show the name of the table and all the information of the fields. However, if the panel is connected with *ODBC*, will only show the name of the table.

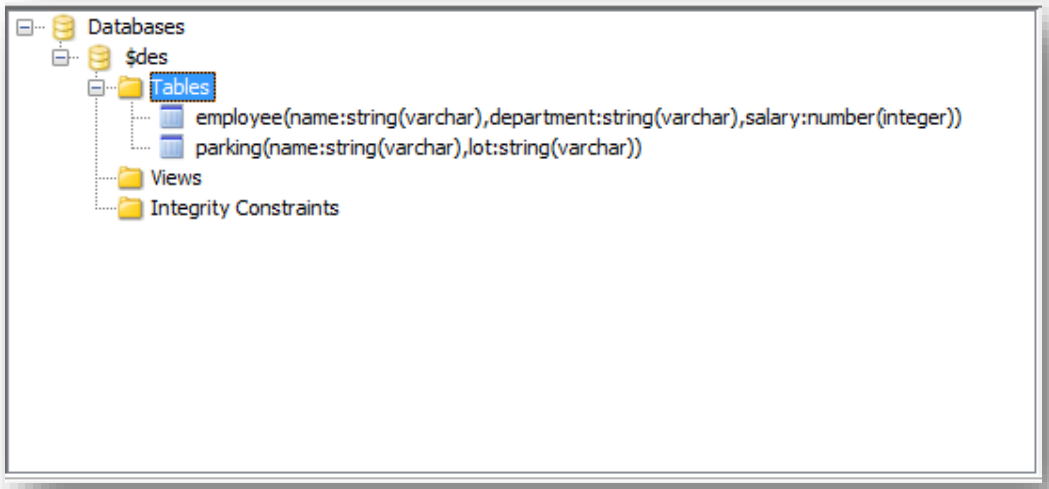


Figure 79: Table node

With the contextual menu of this node you can make the following actions:

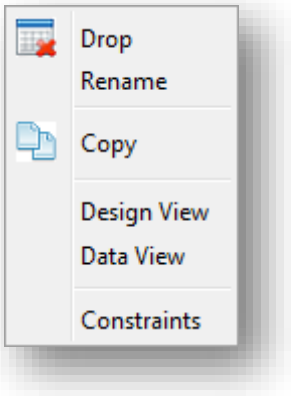


Figure 80: Table node popup menu

8.4.1. DROP

This action will drop the table.

8.4.2. RENAME

The user can change the name of the table with this menu item.

8.4.3. COPY

With this option the user can choose between copying only the schema or copying the schema and the data.

8.4.4. DESIGN VIEW

Display the *Design view* of the selected table where the user can make changes on it, add columns, change the primary key and so on.

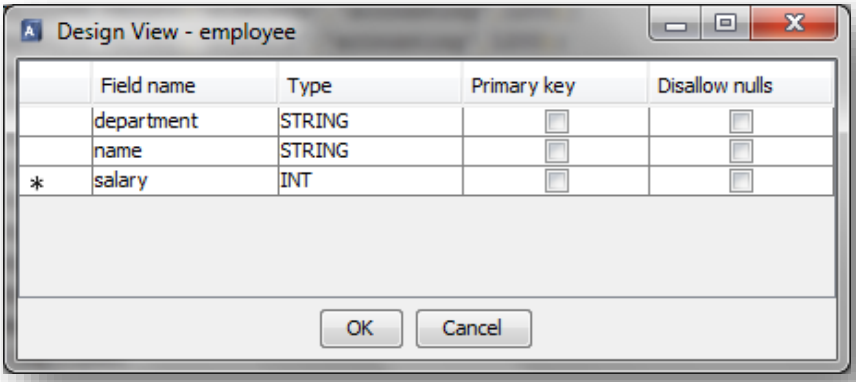


Figure 81: Design view

Clicking on *"OK"* button, changes will be applied. If an error occurs, the table will be restored to its previous schema.

8.4.5. DATA VIEW

Display the following window which shows the data contained in the selected table or view, where the symbol "►" indicates the current record.

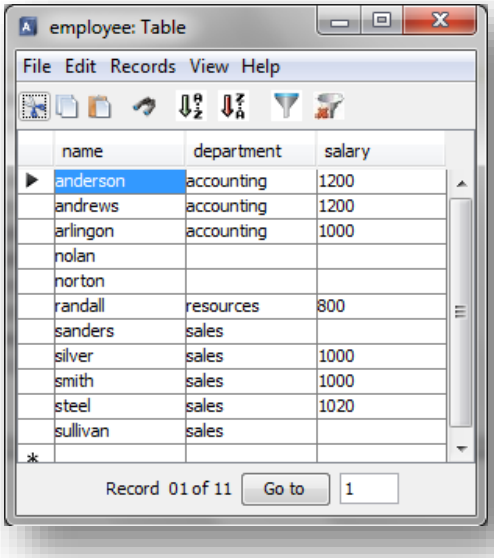


Figure 82: Data view

If it is opened for a view, the modification is not allowed. It can also be openned by clicking twice on a table.

8.4.5.1. ACTIONS PERMITTED ON THE GRID

- **Key navegation:**
  - **Up arrow:** select previous record.
  - **Down arrow:** select next record.
  - **Ctrl + Home:** select the first record.
  - **Ctrl + End:** select the last record.
  - **Tab:** select next field.
  - **Tab + Shift:** select previous field.
- **Sort:**
  - By clicking with the left button on a column header, rows will be sorted ascending: the first record displayed will be the record with the lowest value for this field. Pressing successively on the same field will change the sorting direction.
  - By clicking with the right button on a column header, its popup menu shows up.

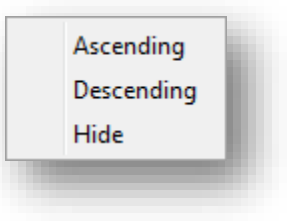


Figure 83: Column header popup

- **Selection:**
  - The user is able to select multiple rows by clicking on the column that contains the asterisk and then dragging the mouse till the end of the selection.

- **Presentation:**
  - The user is able to move the columns by clicking on the column name and dragging it to its new location.

8.4.5.2. MENU BAR

8.4.5.2.1. FILE MENU

Contain the following menu items for the files management:

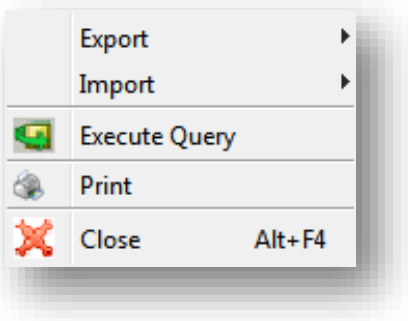
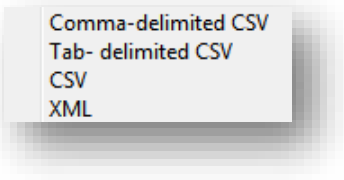


Figure 84: Data view file menu

Next, all the previous menu items will be further explained:

8.4.5.2.1.1. EXPORT

Contain the following menu items for the files management:



- **Comma-delimited CSV:** open a dialog box to select a file. A text file will be created with all the records of the grid and all their fields in the order they appear in the grid, separated by commas.
- **Tab-delimited CSV:** same as comma-delimited CSV, but the separator character between fields is the *tab.*
- **CSV:** open a dialog box where user can write the separator character and proceed to select the file and save the data.
- **XML:** open a dialog box to select a file. A *XML* file will be created with the following structure:

```
<DATA>
<ROW>
<col>value</col>
</ROW>
</DATA>
```

8.4.5.2.1.2. IMPORT

Contain the same menu items as *"Export"* menu item:

- **Comma-delimited CSV:** open a dialog box to select a file. For each line of the text file the value that corresponds to the field appears in the grid. Each line will be inserted in the table as described before.
- **Tab-delimited CSV:** same as comma-delimited CSV but the separator character between fields is the *tab.*
- **CSV:** open a dialog box where user can write the separator character and proceed to select the file and load the data.
- **XML:** open a dialog box to select a file. It will read the *XML* file with the structure indicated above. Each row of data of the *XML* file will be inserted in the table.

8.4.5.2.1.3. EXECUTE QUERY

Display a dialog in which the user will type down the query he wants to perform:

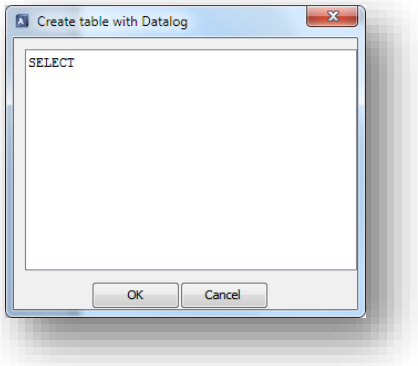


Figure 85: Execute query

8.4.5.2.1.4. PRINT

Display the print window to print the grid.

8.4.5.2.1.5. CLOSE

Close the data view window. It also can be closed with the key combination *"Alt + F4".*

8.4.5.2.2. EDIT MENU

Contain the following menu items for the common grid editor management:

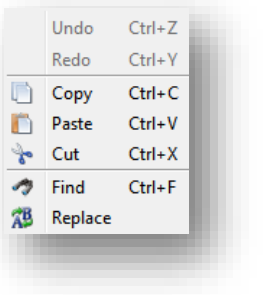


Figure 86: Data view edit menu

8.4.5.2.2.1. UNDO

Undo the updates in the grid. It also can be done with the key combination *"Ctrl + Z".*

8.4.5.2.2.2. REDO

Redo the updates in the grid. It also can be done with the key combination *"Ctrl + Y".*

8.4.5.2.2.3. COPY

Copy the selected text from the grid and put it into the System clipboard. It also can be done with the key combination *"Ctrl+ C"* or with the icon  of the icon bar.

8.4.5.2.2.4. PASTE

Paste the text stored in the System clipboard in the current position of the cursor in the grid. It also can be done with the key combination *"Ctrl + V"* or with the icon  of the icon bar.

8.4.5.2.2.5. CUT

Cut the selected text active field from the grid and put it into the System clipboard. It also can be done with the key combination *"Ctrl + X"* or with the icon  of the icon bar.

8.4.5.2.2.6. FIND

Display the search text window for the *data view*.

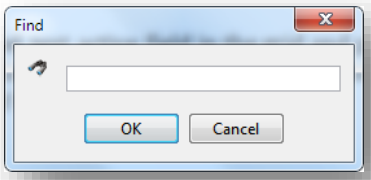


Figure 87: Data view search window

It also can be done with the key combination *"Ctrl + F"* or with the icon  of the icon bar.

8.4.5.2.2.7. REPLACE

Display the replace text window of the *data view:*

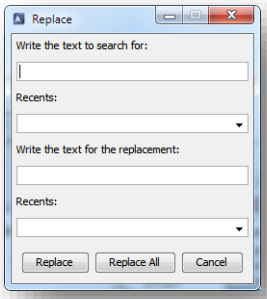


Figure 88: Data view replace window

When a general replacement is performed, it displays the following dialog to the user informing of the *number of replacements:*

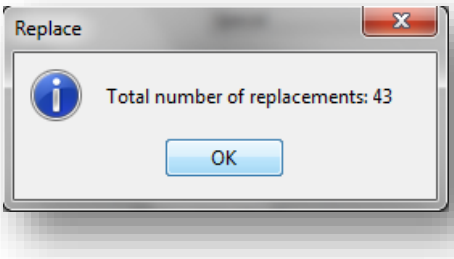


Figure 89: Data view number of replacements

8.4.5.2.3. RECORDS MENU

Contain the following menu items for the common grid editor management:

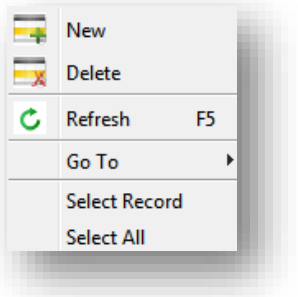


Figure 90: Data view records menu

Next, all the previous menu items will be further explained:

8.4.5.2.3.1. NEW

Insert a new record in the grid. The values of the new record must be written at the last row of the grid. It also can be done clicking in the cell with the *"*"* icon.

8.4.5.2.3.2. DELETE

Delete the selecetd record from the grid.

8.4.5.2.3.3. REFRESH

Update the view of the grid.

8.4.5.2.3.4. GO TO

Contain the following menu items for the common grid editor management:

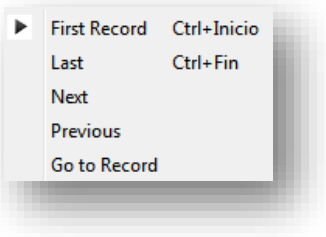
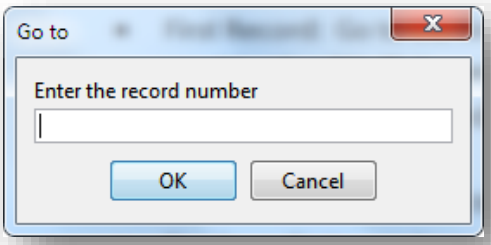


Figure 91: Data view go to menu

- **First record:** Go to the first record. It also can be done with the key combination *"Ctrl+ home"*.
- **Last:** Go to the last record. It also can be done with the key combination *"Ctrl + end".*
- **Next:** Go to next record. It also can be done with the *up arrow key*.
- **Previous:** Go to previous record. It also can be done with the *down arrow key*.
- **Go to record:** display a dialog window where the user will type down the row number he wants go to.



8.4.5.2.3.5. SELECT RECORD

Select the current record from the grid.

8.4.5.2.3.6. SELECT ALL

Select all the records from the grid.

8.4.5.2.4. VIEW MENU

Contain the following menu items for the common grid editor management:

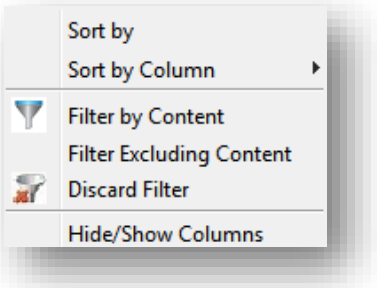


Figure 92: View menu in Data View

Next, all the previous menu items will be further explained.

8.4.5.2.4.1. SORT BY

Displays a window with a grid to select the table field by which sort the table, and the criteria *"Ascending"* ,*"Descending"* or *"None".*

The first column with the checkboxes allows to include or not the attribute in the request. The second one holds a combobox per cell which allows to select the attribute to be shown in that cell and finally the third column allows to choose the type of sort to be applied, this is done by choosing one of them from the combobox embedded in each cell.

It is important to choose the right order in which the sort must be done. Namely, the resultant query for the sort shown in the *Figure 89* is equivalent to:

*SELECT * FROM employee ORDER BY name ASC, department DESC*

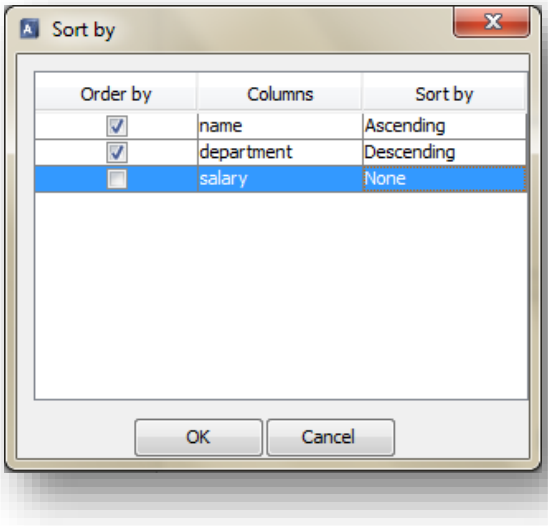
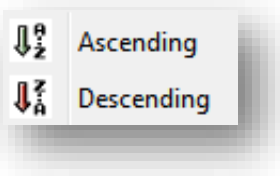


Figure 93: Data view sort by window

Selecting an attribute twice in a query will raise an error.

8.4.5.2.4.2. SORT BY COLUMN

Contains the following menu items for the common grid editor management:



- **Ascending:** it will order the grid ascending by the selected column. It also can be done with the icon  of the icon bar.
- **Descending:** it will order the grid ascending by the selected column. It also can be done with the icon  of the icon bar.

8.4.5.2.4.3. FILTER BY CONTENT

Filter the grid by the content of the selected field. It also can be done with the icon  of the icon bar.

8.4.5.2.4.4. FILTER EXCLUDING CONTENT

Filter records that do not contain the content of the selected field.

8.4.5.2.4.5. DISCARD FILTER

Remove the filter. It also can be done with the icon  of the icon bar.

8.4.5.2.4.6. HIDE/SHOW COLUMNS

Display a window with a grid to select the columns visibility:

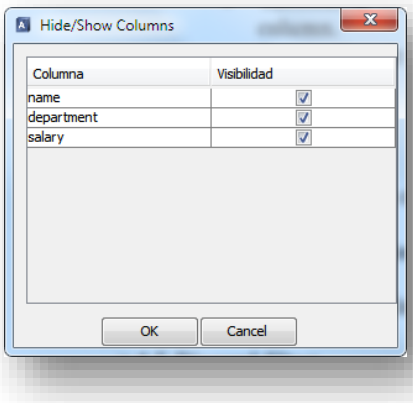


Figure 94: Data view hide/show columns

In case there are hidden columns a message will be displayed at the bottom of the Data View window.

8.4.5.2.5. HELP MENU

Contain the following menu items:

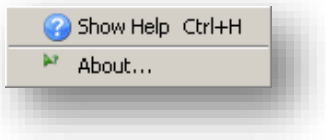


Figure 95: Data view help menu

Next, the previous menu options are further explained

8.4.5.2.5.1. SHOW HELP

Link directly to the user's manual of *DES-ACIDE*.

8.4.5.2.5.2. ABOUT US

Displays the following window with some extra information about the application:

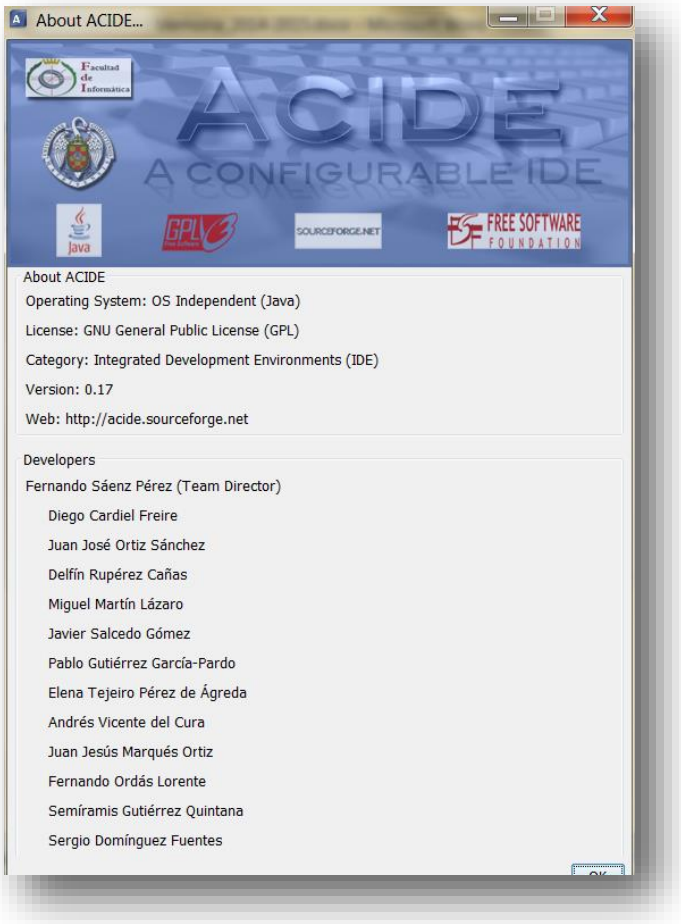


Figure 96: Data view about us window

8.4.6. CONSTRAINTS

Displays a window that allows the management of constraints related to an specific relation.

To define, modify and delete a constraint in a more traditional way it used to be necessary the user to type the respective datalog commands to perform these operations. This may turn out to be a complex task as the complexity of commands increases.

With this interface, the user does not need to know any longer the commands that perform the operations to define, modify and delete a constraint of any type.

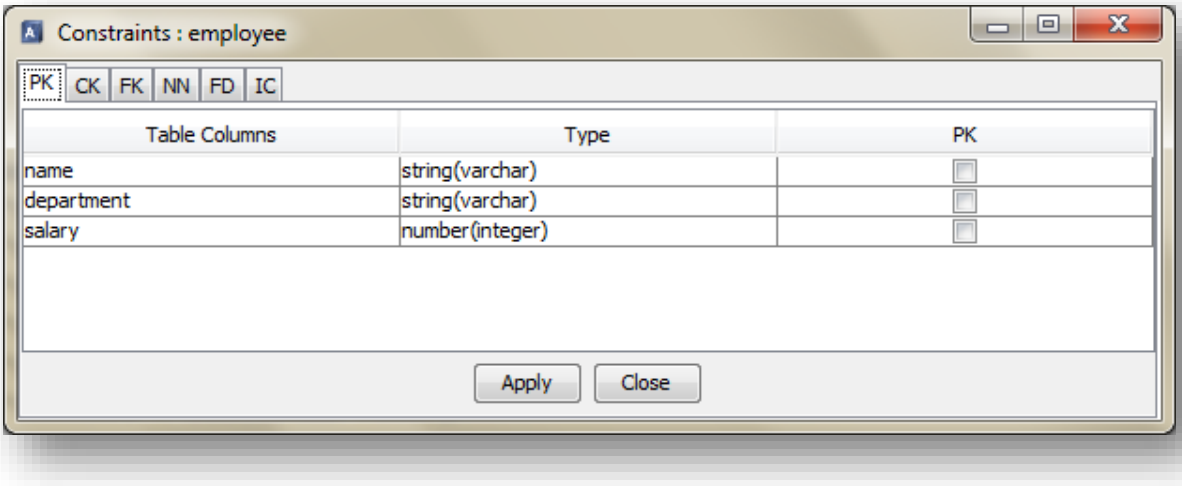


Figure 97: Constraints Window

8.4.6.1. PRIMARY KEY PANEL (PK)

A primary key constraint specifies that no two tuples have the same values for a given set of columns.

This panel allows the user to define, modify and delete primary keys in a given relation.

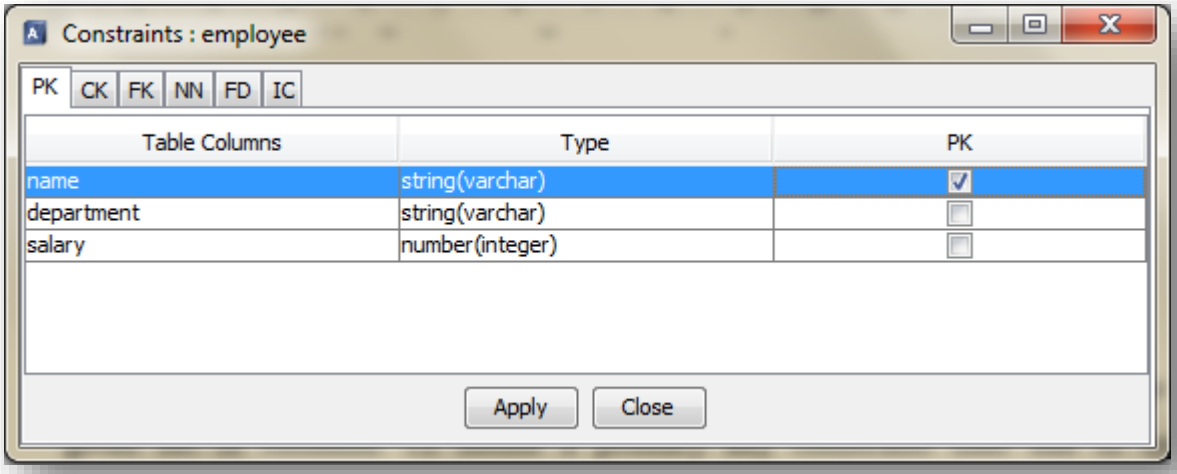


Figure 98: Primary Key Panel

The attributes of a relation are represented in a row, which can be selected or deselected by selecting the checkbox provided for each of them.

The steps to perform the operations of defining, modifying and deleting a primary key are explained below.

8.4.6.1.1. DEFINING A PRIMARY KEY

To define an attribute or a set of attributes as a primary key their respective checkboxes must be selected and then apply the changes.

As a reminder, it is important to point out that if two or more attributes are selected, all of them form a single primary key.

If there is already a primary key, it is replaced by the new one.

This set of steps replaces the following datalog command:

:-pk(name_of_the_relation, [column_name_list])

8.4.6.1.2. MODIFYING A PRIMARY KEY

To modify an existing primary key, the user must select or deselect the attribute or attributes that are target for modifications and apply the changes.

This operation basically works deleting the original primary key and then defining the new one.

8.4.6.1.3. DELETING A PRIMARY KEY

To delete an existing primary key the user must deselect all the attributes that compound the key and then apply the changes.

8.4.6.2. CANDIDATE KEY PANEL (CK)

As a primary key, a candidate key constraint specifies that no two tuples have the same values for a given set of columns.

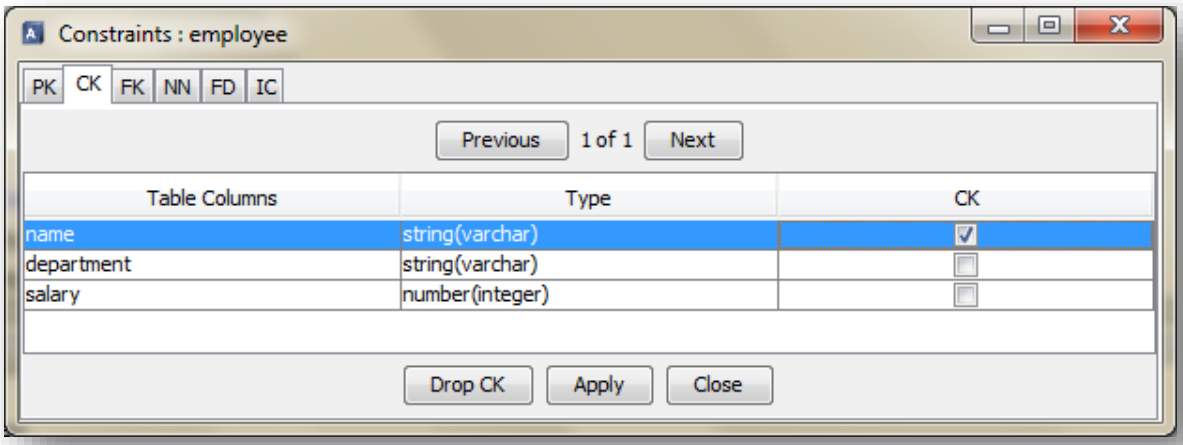


Figure 99: Candidate Key Panel

Although this panel is pretty similar to the Primary Key panel there is a component that makes it different. Since several candidate keys can be defined in a relation, the navigation pane located at the top of the panel allows the user to go through the different screens containing the existing candidates keys.

The steps to perform the operations of defining, modifying and deleting a candidate key are explained below.

8.4.6.2.1. DEFINING A CANDIDATE KEY

In case there are no candidate keys defined for a relation, a table with unchecked checkboxes is created by default. On the other hand, if the

relation already contains one or more candidate keys, these are shown in a different table each one.

As for the latter case, to define a new candidate key is necessary to create a new empty table first. This can be achieved by clicking on the ***Next*** button located at the navigation panel only if it holds that the last existing candidate key is the one shown on screen**.**

To define an attribute or a set of attributes as a candidate key their respective checkboxes must be selected and the changes applied.

As a reminder, it is important to point out that if two or more attributes are selected, all of them form a single candidate key.

This set of steps replaces the following datalog command:

:-ck(name_of_the_relation, [column_name_list])

8.4.6.2.2. MODIFYING A CANDIDATE KEY

To modify an existing candidate key, the user must select or deselect the attribute or attributes that are target for modifications and apply the changes.

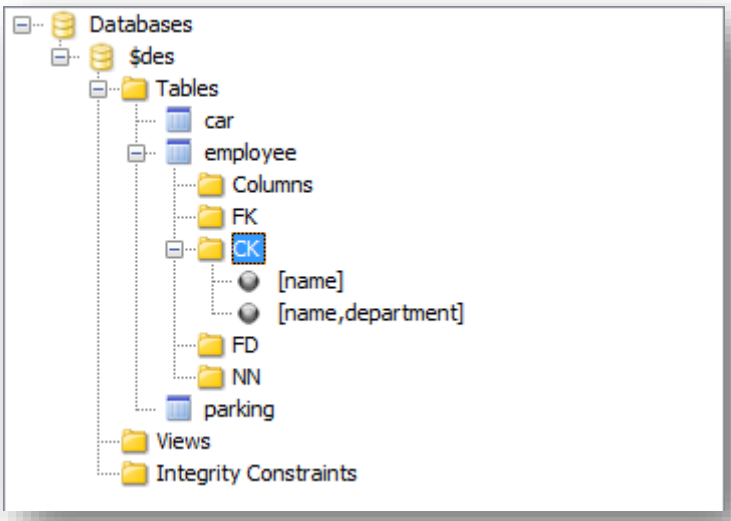
This operation basically works deleting the original candidate key and then defining the new one.

8.4.6.2.3. DELETING A CANDIDATE KEY

To delete an existing candidate key the user can either deselect all the attributes that compound the key or click on the ***Drop CK*** button.

It is important to keep in mind that user changes only affect to the table shown in the current screen, namely, all changes performed must be saved before switching to any other candidate key screen by using the navigation.

As an example of the multiple candidate keys that can be defined, the picture below shows the CK nodes that are added to the tree in the Database Panel for the relation *"employee"* after defining some candidate keys as the ***Figure 95*** suggests.



8.4.6.2.4. FOREIGN KEY PANEL (FK)

A foreign key constraint specifies that the values in a given set of columns of a relation must already exist in the columns declared as primary key constraint of another relation.

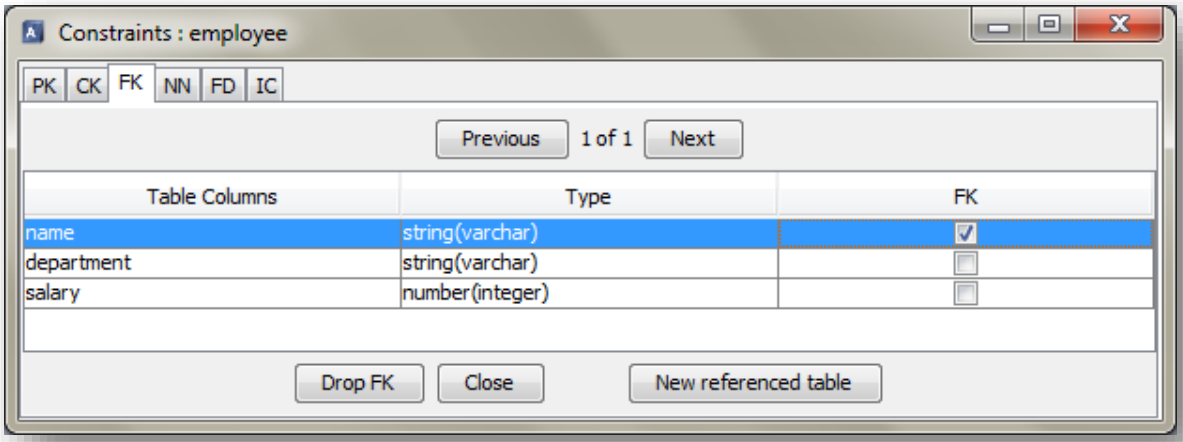


Figure 100: Foreign Key Panel

Since a foreign key references to an attribute of a different relation and several foreign keys can be defined in a relation, this panel allows the user to navigate through the different screens containing all the foreign keys existing in the current relation.

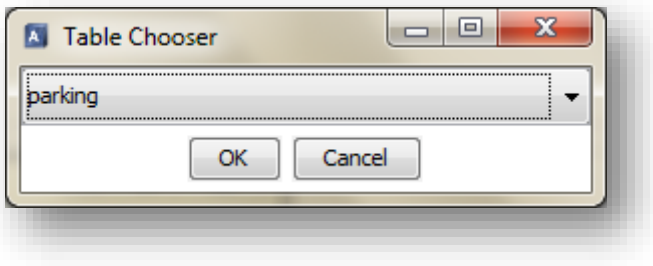
The button located at the bottom on the most right side, allows the user to associate the attributes of the current relation as a foreign key for other relations in the same database. This button adopts two different labels depending on whether the current table shown is a foreign key and thus is already associated to at least another relation. If so, the button is displayed as "***Show referenced tables"*** otherwise it is displayed as ***"New referenced table".***

Before going into details about the operations that can be performed on this panel, the difference of the buttons behavior must be described.

- ***"New referenced table"*** **Button:**

As aforementioned the presence of this label means that the current table on screen is not a foreign key and in order to define it as such, a reference relation must be chosen first.

By clicking on this button a new small window shows up. This window ask the user to choose a relation from the list that its embedded combobox provides.



Picture 101: Table Chooser Window

Once a relation is selected, a new bigger window is displayed, this window contains a table with as many rows as attributes the referenced relation has.

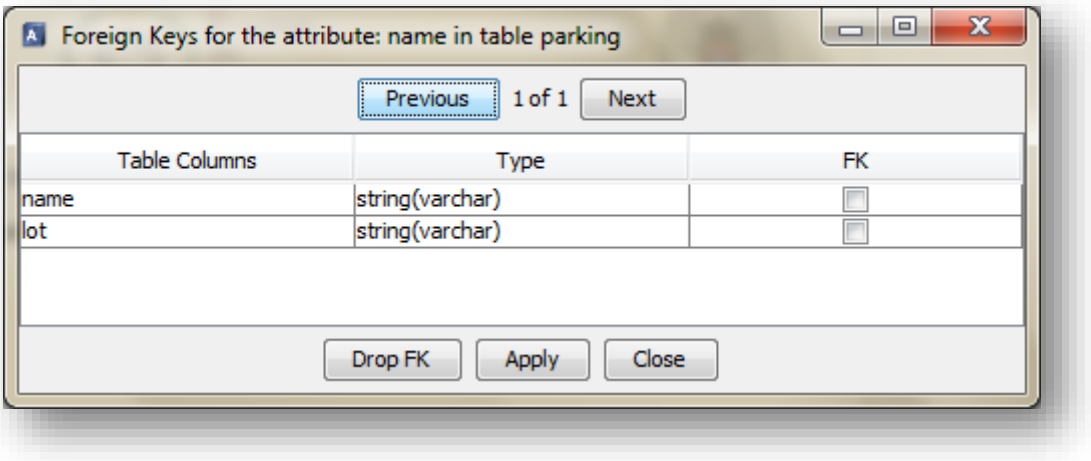


Figure 102: Referenced relation window

The next step is to choose the attribute which the foreign key is going to be related with.

- *"Show referenced tables"* **Button:**

This label implies that the current table on screen is already a foreign key and therefore there is at least one referenced relation. By clicking on this button the following window is displayed.

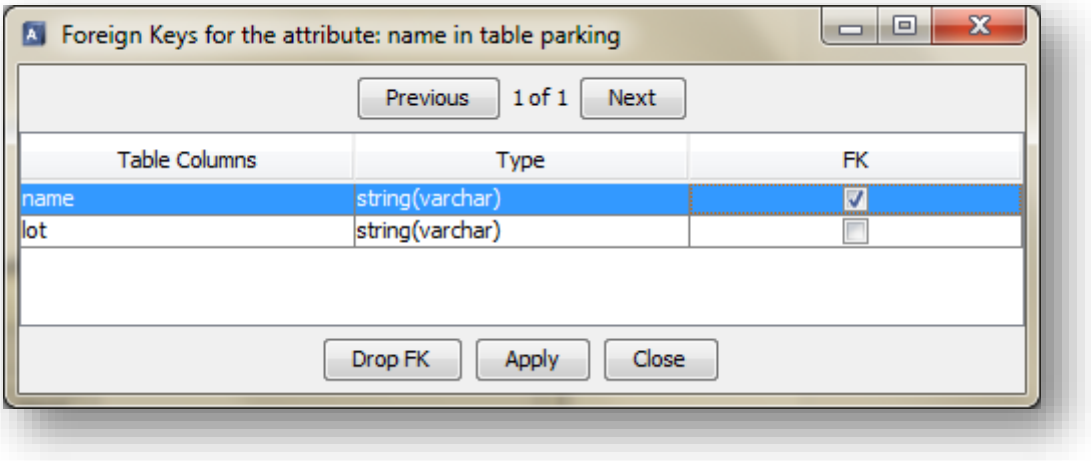


Figure 103: Referenced relations window

This window shows that the attribute "name" of the relation "employee" is a foreign key that references the attribute "name" of the relation "parking".

At this point both cases converge and the operations that can be performed on them follow the same steps.

8.4.6.2.5. DEFINING A FOREIGN KEY

To define a new candidate key is necessary to create a new empty table first. This can be achieved by clicking on the ***Next*** button located at the navigation panel only if it holds that the last existing foreign key is the one shown on screen**.**

As aforementioned for the ***"New referenced table"*** button, it is mandatory to choose the referenced relation first. Thus, the **Table Chooser** window is the first one to be displayed after clicking on such button.

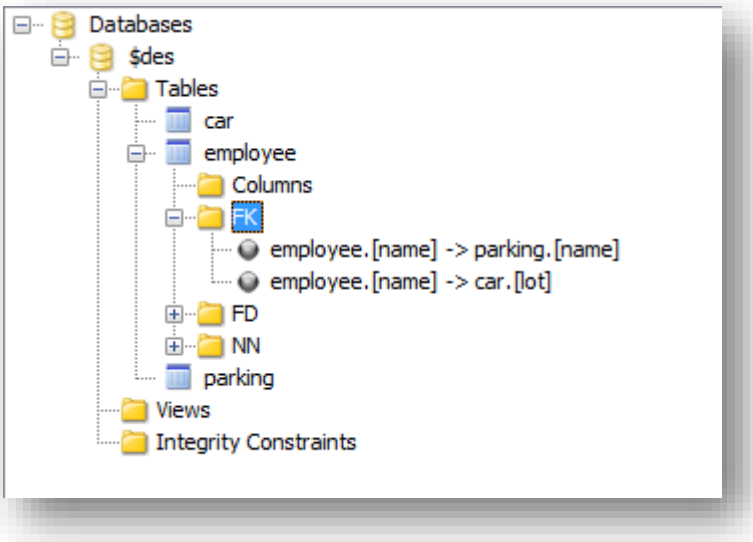
Inmediately after choosing a referenced relation, a new table is added to the **Referenced relations window** depicted in ***Figure 99.*** The final step is to select the attribute to be related with the foreign key.

This set of steps replaces the following datalog command:

:-

fk(name_of_the_target_relation,[name_of_the_column_foreign_key],name_of_source_relation,[name_of_source_column]).

The resultant constraint nodes added to the tree in the Database Panel for the examples used above would be:



8.4.6.2.6. MODIFYING A FOREIGN KEY

To modify an existing foreign key, the user must select or deselect the attribute that is target for modifications on the **Referenced relations window** and apply the changes.

This operation basically works deleting the original foreign key and then defining the new one.

8.4.6.2.7. DELETING A FOREIGN KEY

To delete an existing foreign key the user can either deselect the attribute or attributes that compound the foreign key or click on the ***Drop FK*** button in the **Referenced relations window** (***Fig. 99***).

This action will delete only that specific constraints but not the others in case there are more.

To delete all the existing relations associated to a foreign key in the **Foreing Key Panel**, the user must click on the **Drop FK** button of this panel. This button will be updated and the label ***"New referenced table"*** will be set.

It is important to keep in mind that user changes only affect to the table shown in the current screen, namely, all changes performed must be saved before switching to any other foreign key screen or panel.

8.4.6.3. NOT NULL PANEL (NN)

A Not Null constraint specifies that the values in a given set of columns of a relation must not be null.

As its name suggests, this panel allows the user to set the Not Null restriction to the attributes of a given relation.

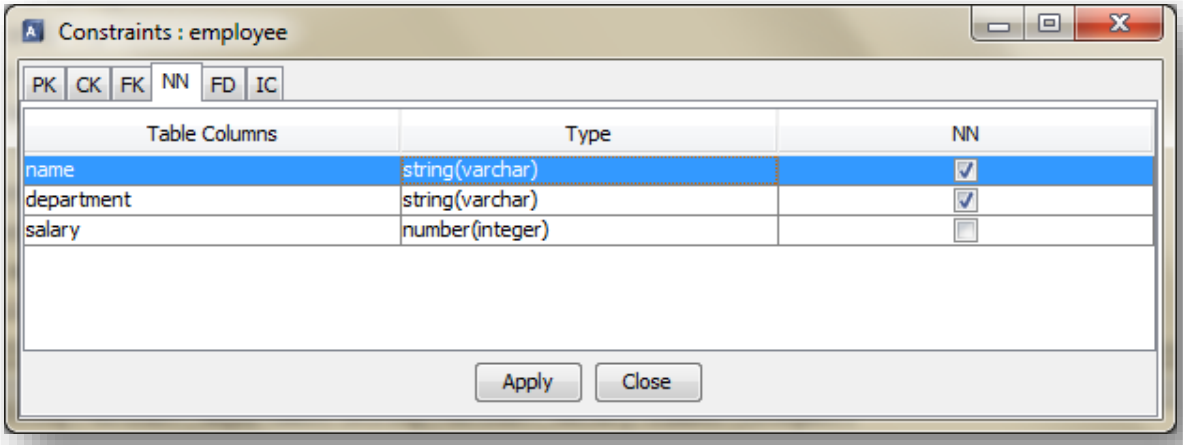


Figure 104: Not Null Panel

8.4.6.3.1. DEFINING A NOT NULL CONSTRAINT

To define an attribute or a set of attributes as a Not Null constraint their respective checkboxes must be selected and then apply the changes.

As a reminder, it is important to point out that if two or more attributes are selected, all of them form a single Not Null constraint.

If there is already a Not Null constraint, it is replaced by the new one.

This set of steps replaces the following datalog command:

:-nn(name_of_the_relation, [column_name_list])

8.4.6.3.2. MODIFYING A NOT NULL CONSTRAINT

To modify an existing Not Null constraint, the user must select or deselect the attribute or attributes that are target for modifications and apply the changes.

This operation basically works deleting the original Not Null constraint and then defining the new one.

8.4.6.3.3. DELETING A NOT NULL CONSTRAINT

To delete an existing Not Null constraint the user must deselect all the attributes that compound the constraint and then apply the changes.

8.4.6.4. FUNCTIONAL DEPENDENCY PANEL (FD)

A functional dependency constraint specifies that, given a set of attributes A1, of a relation R, they functionally determine another set A2, i.e., each tuple of values of A1 in R is associated with precisely one tuple of values A2 in the same tuple of R.

Since a functional dependency associates different attributes in a same relation, this panel shows the relation twice so all the components of the right side of the functional dependency are located in the right table and the same is done for the components of the left side of the functional dependency.

As shown in the ***Figure 101***, several functional dependencies can be defined for a relation. Due to this, the panel contains a navigation pane that allows the user to navigate through all the existing functional dependencies.

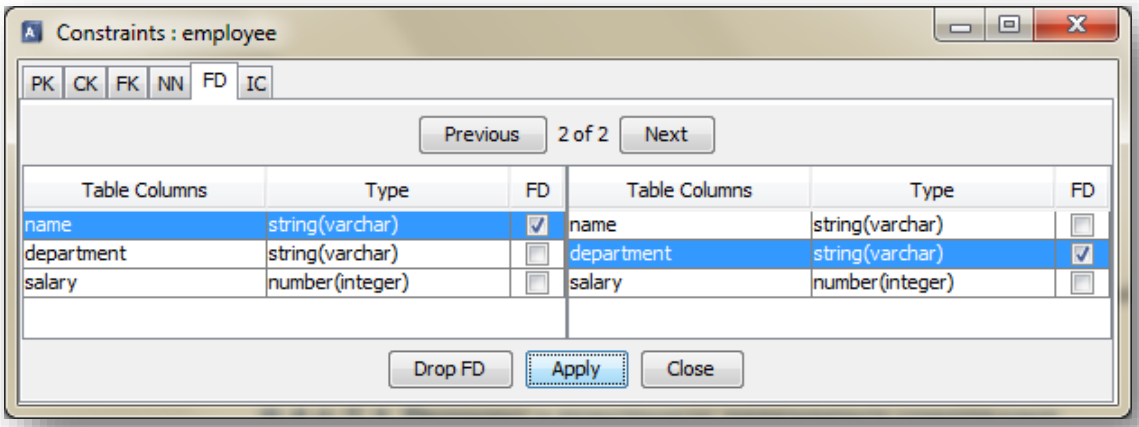


Figure 105: Functional Dependency panel

Operations such as defining, modifying and deleting can be performed in this panel by following the steps described below.

8.4.6.4.1. DEFINING A FUNCTIONAL DEPENDENCY CONSTRAINT

In case there are no functional dependencies defined for a relation, two tables representing the same relation with unchecked checkboxes is created by default. On the other hand, if the relation already contains one or more functional dependencies, these are shown in a different screens each one.

As for the latter case, to define a new functional dependency is necessary to create a new screen with two empty tables first. This can be achieved by clicking on the ***Next*** button located at the navigation panel only if it holds that the last existing functional dependency is the one shown on screen**.**

To define an attribute or a set of attributes as a functional dependency their respective checkboxes in both tables must be selected and the changes applied.

As a reminder, it is important to point out that if two or more attributes are selected in one of the tables, all of them form either the right or the left side of the functional dependency.

This set of steps replaces the following datalog command:

:-fd(name_of_the_relation, [column_name_list],[column_name_list])

8.4.6.4.2. MODIFYING A FUNCTIONAL DEPENDENCY CONSTRAINT

To modify an existing functional dependency, the user must select or deselect the attribute or attributes that are target for modifications and apply the changes.

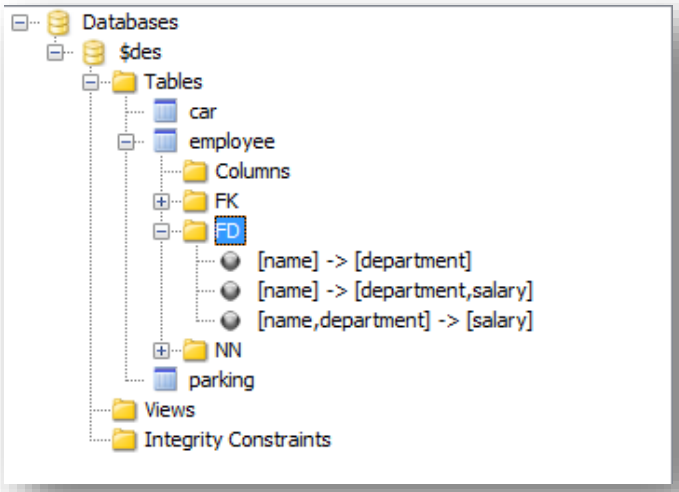
This operation basically works deleting the original functional dependency constraint and then defining the new one.

8.4.6.4.3. DELETING A FUNCTIONAL DEPENDENCY CONSTRAINT

To delete an existing functional dependency constraint the user can either deselect all the attributes that compound the constraint or click on the ***Drop FD*** button.

It is important to keep in mind that user changes only affect to the table shown in the current screen, namely, all changes performed must be saved before switching to any other functional dependency screen by using the navigation pane.

As an example, the FD nodes generated and added to the tree in the Database Panel for the relation "employee" due to the operations performed in this relation as the Figure 101 suggests, would be:



8.4.6.5. INTEGRITY CONSTRAINTS PANEL (IC)

A integrity constraint is represented with a rule without head. The rule body is an assertion that specifies incosistent data, i.e., should this body be proved, any inconsistency is detected and reported to the user.

This panel allows the user to define their own constraints in a given relation as well as to perform modification and delete operations.

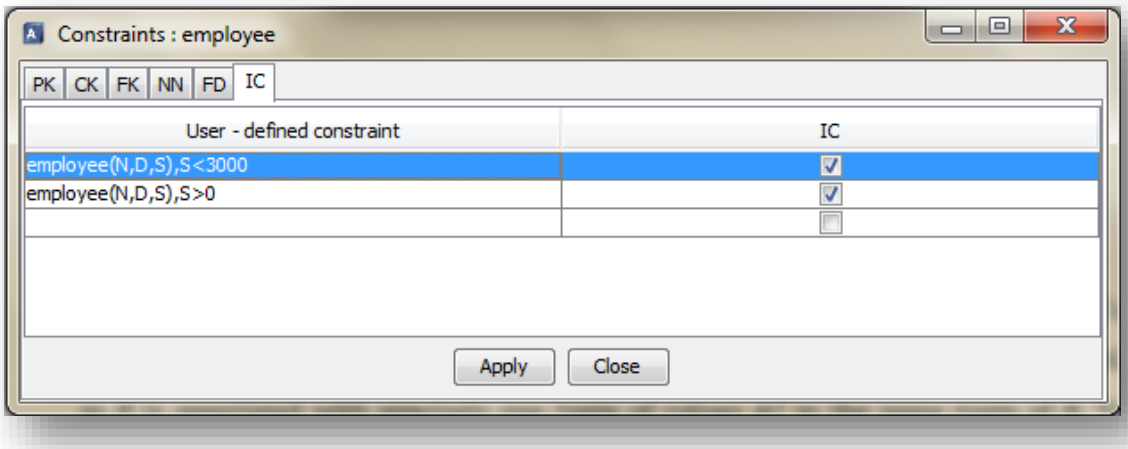


Figure 106: Integrity Constraints Panel

Since the constraints are defined by the user these cannot be fit into a specific structure as seen in the previous panels. Thus, this panel implements a table with two columns, the first one is intended to be filled with the user defined constraints and the second one to validate any operation that can be performed on a constraint.

The cells of the first column are editable, so the user can insert and edit their constraints at any time. The only requeriment to validate these operations is first to check the corresponding checkbox and after apply the changes.

Several constraints can be defined in a relation for this reason there is always an empty row at the end of the table. Every time this row is filled with a restriction a new empty row is generated letting the user to define more constraints inmediately.

8.4.6.5.1. DEFINING A USER DEFINED CONSTRAINT

The cells of the first column are editable, so the user can insert their constraints by clicking twice on an empty cell. The only requeriment to validate this operation is first to check the corresponding checkbox and after apply the changes.

Several constraints can be defined in a relation for this reason there is always an empty row at the end of the table. Every time this row is filled with a restriction a new empty row is generated letting the user to define more constraints inmediately.

8.4.6.5.2. MODIFYING A USER DEFINED CONSTRAINT

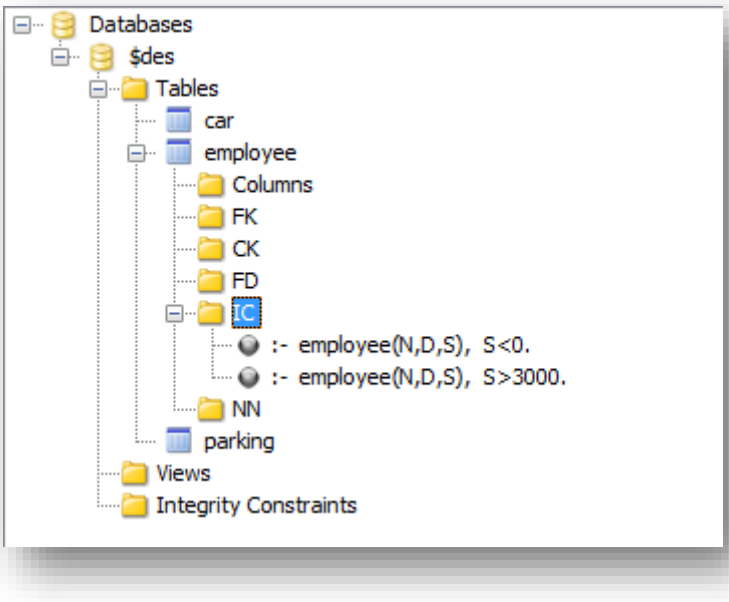
To modify an existing user defined constraint the user must select or deselect the corresponding checkbox of the constraints that are target for modifications and apply the changes.

Previously, the constraint must be modified by clicking twice on its cell container and editing its content.

8.4.6.5.3. DELETING A USER DEFINED CONSTRAINT

To delete an existing user defined constraint the user must uncheck its respective checkbox and then apply the changes.

As a result of adding the user defined constraints shown in Figure 102 , the nodes depicted in the picture below would be added to the tree in the Database panel for the relation “employee”.



Declaring such integrity constraints implies to change your mind w.r.t usual consistency constraints as domain constraints in SQL. For instance, to specify that a column c of a table t can take values between two integers one can use the SQL clause CHECK in the creation of the table as follows:

CREATE TABLE t(c INT CHECK (c BETWEEN 0 AND 10));

8.5. CHILDREN OF TABLE NODES

Under the table node the user can see the information of the columns and all the constraints like primary key, foreign key and so on.

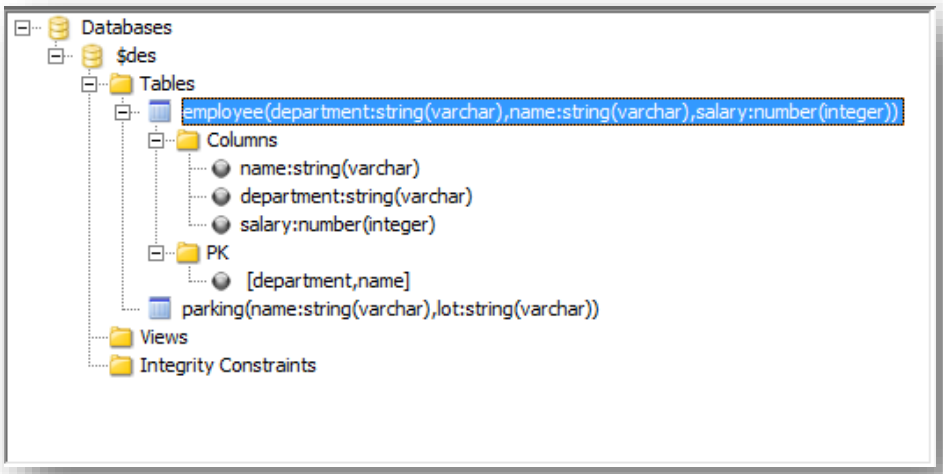


Figure 107: Children of table nodes

8.5.1. NODE COLUMNS

This node shows all the attributes or columns of a relation represented by a leaf node that specifies the name and type of each attribute.

Different constraints can be applied on each of these columns in a straightforward way. This is achieved by selecting any of the possible operations offered in the popup menu of each leaf node.

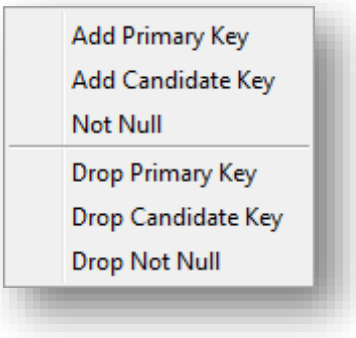


Figure 108: Column node popup

8.5.2. NODE CONSTRAINTS

In the primary key node, and in all the nodes which define a constraint (in the figure the node [department, name]), the user has these options in the popup menu.

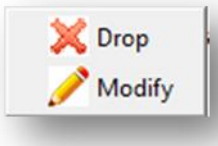


Figure 109: Node Constraints Popup Menu

8.5.2.1. DROP

It will drop the restriction.

8.5.2.2. MODIFY

The user can modify the restriction with this action.

8.6. VIEWS NODE

The children of this node are all the views of the selected database. Its *popup menu* is the following:

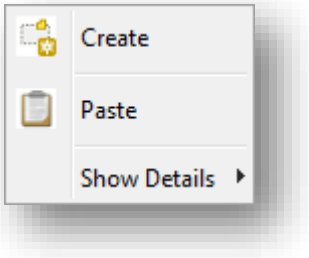


Figure 110: Views Node Popup Menu

8.6.1. CREATE

With the next window the user can create a view, defining it with an *SQL* command:

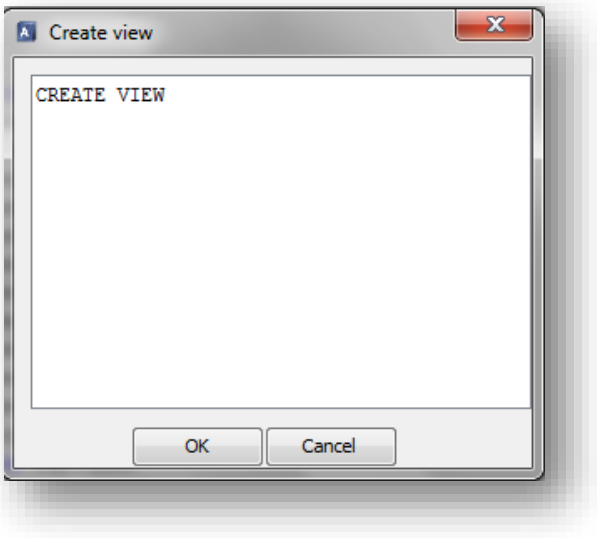


Figure 111: Create view window

8.6.2. PASTE

A new view will be created with the same schema than the view that had been copied before.

8.6.3. SHOW DETAILS

Allowthe user to customize the visualization of the view nodes. The selection is also performed on the table nodes.

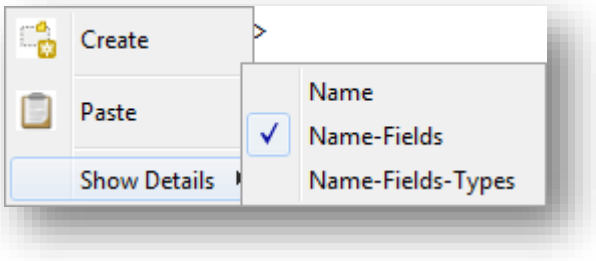


Figure 112: Show Details Menu Views Node

8.7. VIEW NODE

This node relates the name and the fields information of one view of the selected database.

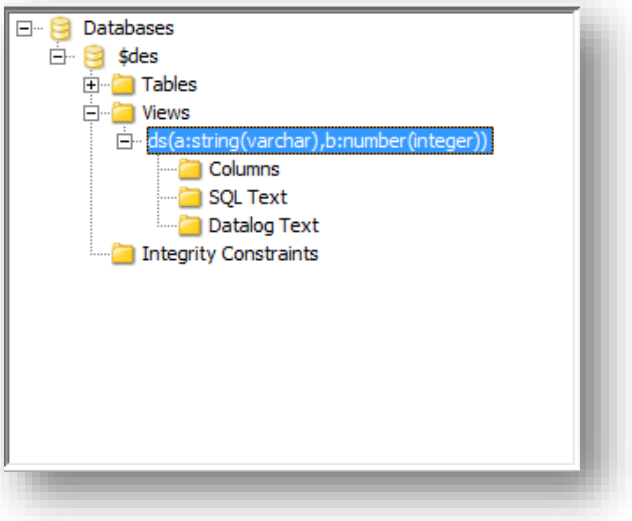


Figure 113: View node

Its *popup menu* is as follows:

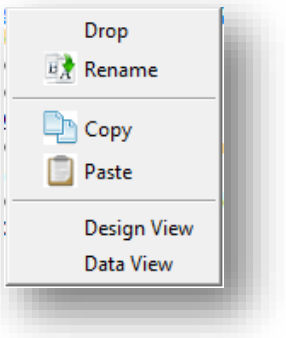


Figure 114: View node popup menu

8.7.1. DROP

The view will be deleted from the database.

8.7.2. RENAME

The user can change the name of the view with this action.

8.7.3. COPY

The schema of the selected view will be copied to the clipboard.

8.7.4. PASTE

A new view with the schema of the view copied in the clipboard before will be created.

8.7.5. DESIGN VIEW

A window with the *SQL* text of the view will be showed.

8.7.6. DATA VIEW

It is almost identical to *Data view* for Tables, explained before on *Chapter 8.4.5*.

8.8. COLUMNS NODES

The children of this node are all the columns of the selected view.

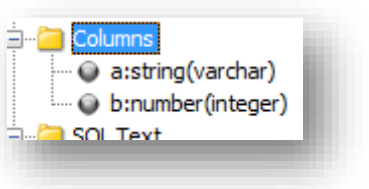


Figure 115: Columns nodes

8.9. SQL TEXT , RA TEXT AND DATALOG TEXT NODES

These nodes show the *SQL or RA* and *Datalog* commands of the view definition.

The SQL Text or RA Text node is added to a view depending on the type of the view. If the view was generated with a SQL statement then it will contain an SQL Text node, the same is applied to the views generated with RA statements.

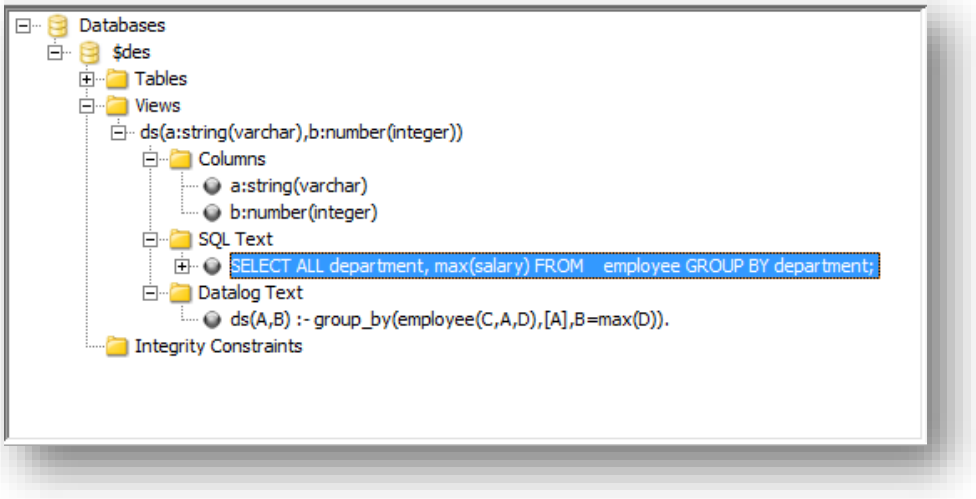
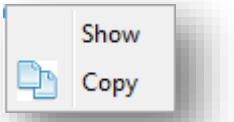


Figure 116: SQL and Datalog text nodes

The user can either click twice on the node that represents the SQL/RA Text or choose the "Show" option of its popup menu in order to display a window allowing the user to edit its content.



With the popup menu user is also able to copy the definition text.

The content of the window depends on the type of node, for a SQL Text node it will contain its SQL statement and the same for RA Text nodes.

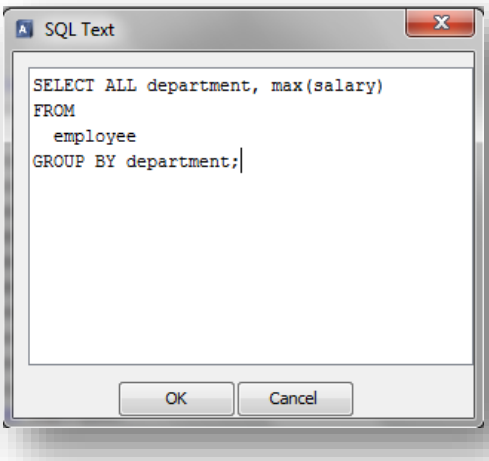


Figure 117: SQL text

Datalog Text node is generated by default and is added to a View node no matter the type of it, SQL or RA. Thus, its content cannot be edited and its window is displayed in only read mode.

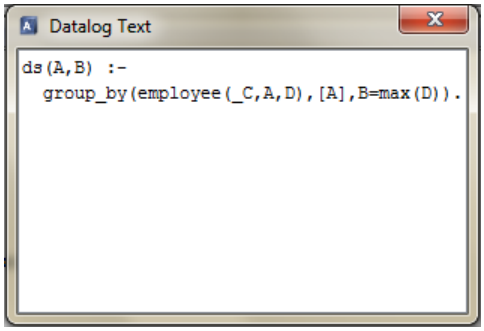


Figure 118: Datalog text

9. PDG PANEL

Show the dependencies graph attached to a datalog file. An example of the graph panel is as follows:

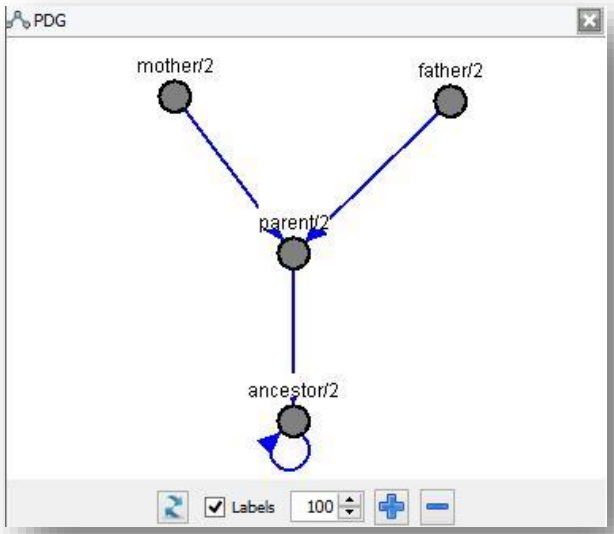


Figure 119: PDG Panel

The nodes can be located by clicking and dragging them. The buttons in the bottom of the panel are used to zoom in and out the graph. This effect can also be achieved by scrolling the mouse wheel while pressing CTRL key. The graph can be regenerated by clicking on the refresh button. The labels can be shown or hidden by clicking on the *show labels* button

This graph is highly customized; the shape of the nodes, the color and end of the arrows can be switched (explained in *chapter 3.5.5*).

10. DEBUG PANEL

Show a navigable dependences graph of the database for a certain datalog predicate or a sql view.

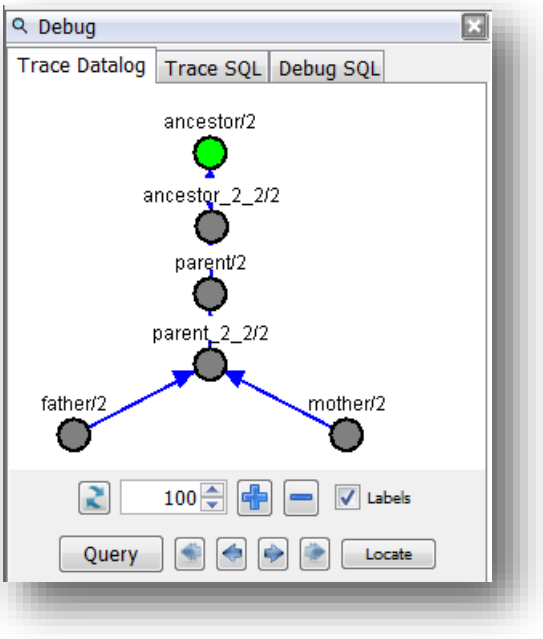


Figure 120: Debug Panel

10.1. TRACE DATALOG PANEL

Show a navigable dependences graph of the database for a certain datalog predicate.

Navigation between nodes corresponds to the output of the command /tapi /trace_datalog for the graph's generator query. The user can directly navigate to a node by clicking on it.

The definition of the predicate will also be highlighted on the file editor panel.

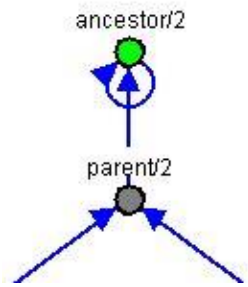


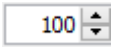
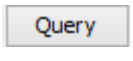
Figure 121: Selected Node

```
30 ancestor(X,Y) :-
31   parent(X,Y).
32 ancestor(X,Y) :-
33   parent(X,Z),
34   ancestor(Z,Y).
```

Figure 122: Highlighted text

If the user performs a double click on the node the data view window of the database table corresponding to the selected predicate will be displayed.

Next, we further explain all the components:

-  **Refresh button:** refresh the dependences graph.
-  **Zoom slider:** manipulate the zoom level.
-  **Zoom in button:** increase the zoom level.
-  **Zoom out button:** decrease the zoom level.
-  **Labels check box:** hide/display the labels of the nodes.
-  **Query button:** Open the query window where the user can input the predicate to trace.

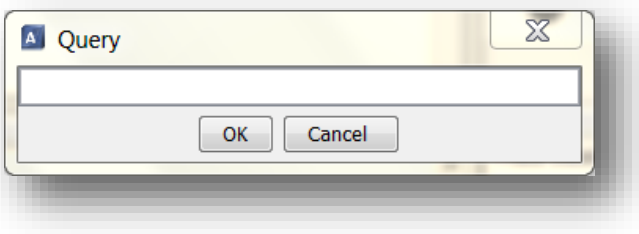
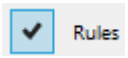


Figure 123: Query window

-  **Previous node button:** Go to the previous node according to the /trace_datalog command.
-  **Next node button:** Go to the next node according to the /trace_datalog command.
-  **First node button:** Go to the first node according to the /trace_datalog command.
-  **Last node button:** Go to the last node according to the /trace_datalog command.
- 

Rules check box: Highlight/unhighlight the text on the file editor panel.
- 

Locate button: Show the text corresponding to the selected node of the graph on the file editor panel.

10.2. TRACE SQL PANEL

Show a navigable dependences graph of the database for a certain sql view.

Navigation between nodes corresponds to the output of the command /tapi /trace_sql for the graph's generator query. The user can directly navigate to a node by clicking on it.

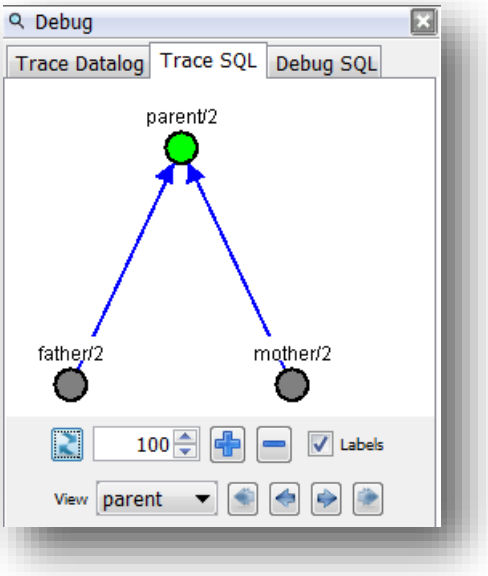


Figure 124: Trace SQL panel

If the user performs a double click on the node the data view of the database table/view corresponding to the selected node will be displayed.

Next, we further explain all the components:

- **Refresh button:** refresh the dependences graph.
- **Zoom slider:** manipulate the zoom level.
- **Zoom in button:** increase the zoom level.
- **Zoom out button:** decrease the zoom level.
- **Labels check box:** hide/display the labels of the nodes.
- **View list:** Display the views list where the user can the one to trace.
- **Previous node button:** Go to the previous node according to the /trace_sql command.
- **Next node button:** Go to the next node according to the /trace_sql command.
- **First node button:** Go to the first node according to the /trace_datalog command.

- **Last node button:** Go to the last node according to the /trace_datalog command.
- SQL Text **SQL Text check box:** Activate, for a view node, the selection of the SQL Text node on the database panel corresponding to the selected node of the graph.

10.3. DEBUG SQL PANEL

Show a navigable dependences graph of the database for a certain sql view and helps the user to debug the view. In the future, this panel should automatically display the nodes in error (red nodes). Now, the user can manually mark each node.

Navigation between nodes corresponds to the output of the command /tapi /trace_sql for the graph's generator query. The user can directly navigate to a node by clicking on it.

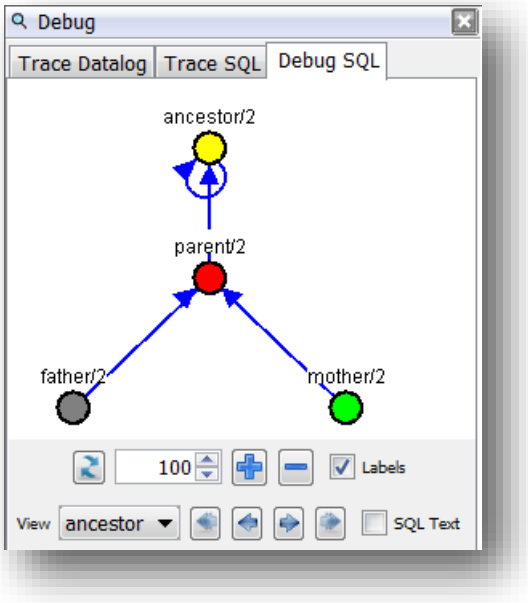


Figure 125: Debug SQL panel

If the user performs a right click on the node the menu view of the node can change his color properties to identify a "valid node" (green), "no valid node" (red) or "unknown node" (gray).

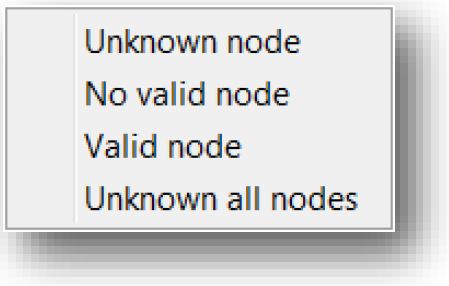
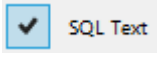


Figure 126: Debug node popup menu

Next, we further explain all the components:

-  **Refresh button:** refresh the dependences graph.
-  **Zoom slider:** manipulate the zoom level.
-  **Zoom in button:** increase the zoom level.
-  **Zoom out button:** decrease the zoom level.
-  **Labels check box:** hide/display the labels of the nodes.
-  **View list:** Display the views list where the user can the one to trace.
-  **Previous node button:** Go to the previous node according to the /trace_sql command.
-  **Next node button:** Go to the next node according to the /trace_sql command.
-  **First node button:** Go to the first node according to the /trace_datalog command.
-  **Last node button:** Go to the last node according to the /trace_datalog command.

   **SQL Text check box:** Activate, for a view node, the selection of the SQL Text node on the database panel corresponding to the selected node of the graph

11. ASSERTED DATABASE PANEL

Show the asserted rules and facts made on the asserted database, sorted by predicate. An example of the asserted database panel is as follows:

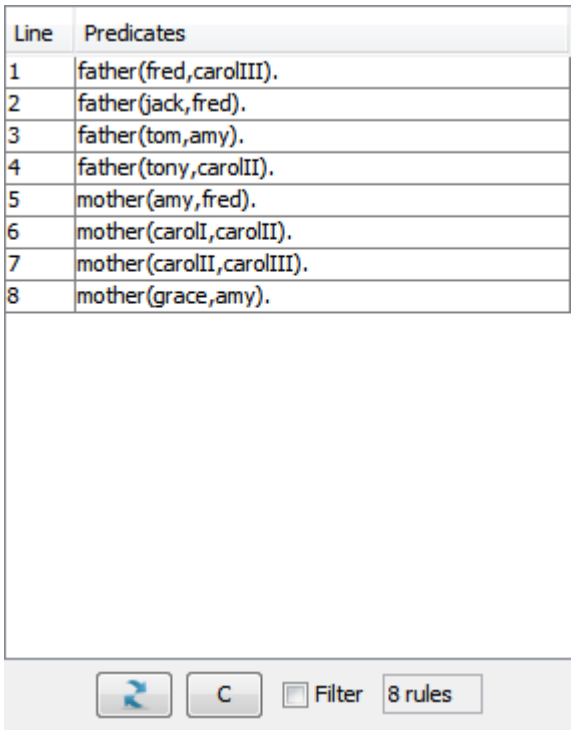
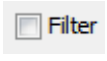


Figure 127: Asserted Database Panel

Next, we further explain all the components:

-  **Refresh button:** refresh the asserted database panel, adding or erasing rows in the current table of predicates.
-  **Clear button:** if there are any rows selected, remove the selection.
-  **Filter check box:** when the filter check box is enabled, take the current selected node in the debug panel and show the rules linked to that node.
-  **Number of rules:** show the number of rule in the asserted database, this field is just informational.

12. STATUS BAR

Contain some information about the active file, the current project and so on. It is as follows:

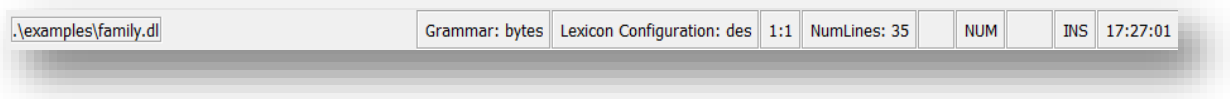


Figure 128: Status bar

Next, we further describe all the components:

- **Panel 1:** the *status message* is displayed. It shows the path and name of the active file in the *File Editor*.
- **Panel 2:** the *syntactic configuration* shows the name of the grammar applied to the current project.
- **Panel 3:** the *lexicon configuration* shows the name of the lexicon applied to the current project.
- **Panel 4:** shows the line and column where the caret is.
- **Panel 5:** *BLOQ MAYUS* status.
- **Panel 5:** *BLOQ NUM* status.
- **Panel 6:** *BLOQ SCROLL* status.
- **Panel 7:** writing mode: *INSERT* or *OVERWRITE.*
- **Panel 8:** the *System* clock.

13. ACCESSIBILITY SHORTCUTS

The application offers some accessibility shortcuts to wrapper common user actions such as:

- **F3 + Selected text:** performs the *forward* text search with the selected text in the file editor, in the console panel or in the data view window.
- **F3 + Shift + Selected text:** performs the *backward* text search with the selected text in the file editor, in the console panel or in the data view window.
- **Mouse wheel:** performs the vertical scroll line by line in the file editor and console panel.
- **Control + mouse wheel:** performs the zoom effect for the font size in the file editor, console panel and graph panel.
- **Shift + Tab:** in case a Tab action has been performed, undo the action.

Others accessibility shortcuts depends on the language of the application.

13.1. ACCESSIBILITY SHORTCUTS IN ENGLISH

Shortcuts in *File menu:*

- **Ctrl + N:** Create new file.
- **Ctrl + O:** Open a file.
- **Ctrl + S:** Save active file in the file editor.
- **Ctrl + Shift + S:** Save all files in the file editor.
- **Ctrl + P :** Print active file in the file editor.
- **Alt + X:** Close the application.

Shortcuts in *Edit menu:*

- **Ctrl + Z:** Undo the last action.
- **Ctrl + Y:** Redo the last change.
- **Ctrl + C:** Copy the selected text to the System clipboard.

- **Ctrl + X:** Cut the selected text to the System clipboard.
- **Ctrl + V:** Paste the test in the System clipboard.
- **Ctrl + E:** Select all the text in the active file of the file editor.
- **Ctrl + F:** Open the search window.
- **Ctrl + R:** Open the replace window.
- **Ctrl + U:** Transforms to uppercase a given text.
- **Ctrl + L:** Transforms to lowercase a given text.
- **Ctrl + Shift + U:** Capitalize every word in a given text.
- **Ctrl + Shift + L:** Alternates between uppercase and lowercase every word in a given text.
- **F9:** Send file content to Console.

Shortcuts in *Project menu:*

- **Alt + Shift + N:** Create a new project.
- **Alt + Shift + O:** Open a project.
- **Alt + Shift + S:** Save the opened project.
- **Alt + Shift + A:** Add a file to the opened project.
- **Alt + C:** Compile the opened project.
- **Alt + E:** Execute the opened project.

Shortcuts in *View menu:*

- **Alt + Shift + L:** Show the log tab.

Shortcuts in Configuration menu:

- **Ctrl + Shift + L:** Documents lexicon.
- **Ctrl + Shift + X:** Modifiy the lexicon.
- **Ctrl + Shift + T:** Create a new grammar.
- **Ctrl + Shift + A:** Active line wrapping.
- **Ctrl + Shift + F:** Open the search in console window.

Shortcuts in *Help menu:*

- **Ctrl + H:** Show this document.

Shortcuts in *Data view:*

- **Up arrow:** Go to previous record.
- **Down arrow:** Go to next record.
- **Tab:** Go to next field.
- **Shift + Tab:** Go to previous field.
- **Alt + F4:** Close the *Data view* window.
- **Ctrl + Z:** Undo the updates in the grid.
- **Ctrl + Y:** Redo the last undo in the grid.
- **Ctrl + C:** Copy the selected data from the grid to the System clipboard.
- **Ctrl + V:** Paste the data stored in the System clipboard in the current position of the cursor in the grid.
- **Ctrl + X:** Cut the selected text active field from the grid to the System clipboard.
- **Ctrl + F:** Show the search text window for the *Data view.*
- **F5:** Refresh the view of the grid.
- **Ctrl + home:** Go to the first record.
- **Ctrl + end:** Go to the last record.
- **Ctrl + H:** Link directly to the present document.

Shortcuts in *Menu configuration:*

- **Up arrow:** Select previous object.
- **Down arrow:** Select next object.
- **Ctrl + Home:** Select the first object.
- **Ctrl + End:** Select the last object.
- **Tab:** Select next attribute.
- **Tab + Shift:** Select previous attribute.
- **Esc:** Deselect the selected object.

Shorcuts in *asserted database*:

- **Alt + F4:** Close the window.

- **F5:** Refresh the asserted database panel.
- **C:** Remove the current selection of the rows.

Shortcuts in *database panel*:

- **Supr:** Deletes a selected view o table.
- **Ctrl + C:** Copies the selected node and its content if available.
- **Ctrl + V:** Paste the seleceted node and its content if available.

13.2. ACCESSIBILITY SHORTCUTS IN SPANISH

Shortcuts in *File menu:*

- **Ctrl + N:** Create new file.
- **Ctrl + O:** Open a file.
- **Ctrl + G:** Save active file in the file editor.
- **Ctrl + Shift + G:** Save all files in the file editor.
- **Ctrl + P :** Print active file in the file editor.
- **Alt + X:** Close the application.

Shortcuts in *Edit menu:*

- **Ctrl + Z:** Undo the last action.
- **Ctrl + Y:** Redo the last change.
- **Ctrl + C:** Copy the selected text to the System clipboard.
- **Ctrl + X:** Cut the selected text to the System clipboard.
- **Ctrl + V:** Paste the test in the System clipboard.
- **Ctrl + E:** Select all the text in the active file of the file editor.
- **Ctrl + B:** Open the search window.
- **Ctrl + R:** Open the replace window.
- **Ctrl + U:** Transforms to uppercase a given text.
- **Ctrl + L:** Transforms to lowercase a given text.
- **Ctrl + Mayús + U:** Capitalize every word in a given text.

- **Ctrl + Mayús + L:** Alternates between uppercase and lowercase every word in a given text.

Shortcuts in *Project menu:*

- **Alt + Shift + N:** Create a new project.
- **Alt + Shift + O:** Open a project.
- **Alt + Shift + S:** Save the opened project.
- **Alt + Shift + A:** Add a file to the opened project.
- **Alt + C:** Compile the opened project.
- **Alt + E:** Execute the opened project.

Shortcuts in *View menu:*

- **Alt + Shift + L:** Show the log tab.

Shortcuts in Configuration menu:

- **Ctrl + Shift + L:** Document lexicon.
- **Ctrl + Shift + X:** Modifiy the lexicon.
- **Ctrl + Shift + T:** Create a new grammar.
- **Ctrl + Shift + A:** Active line wrapping.
- **Ctrl + Shift + F:** Open the search in console window.

Shortcuts in *Help menu:*

- **Ctrl + H:** Show this document.

Shortcuts in Data view:

- **Up arrow:** Go to previous record.
- **Down arrow:** Go to next record.
- **Tab:** Go to next field.
- **Shift + Tab:** Go to previous field.
- **Alt + F4:** Close the *Data view* window.

- **Ctrl + Z:** Undo the updates in the grid.
- **Ctrl + Y:** Redo the last undo in the grid.
- **Ctrl + C:** Copy the selected data from the grid to the System clipboard.
- **Ctrl + V:** Paste the data stored in the System clipboard in the current position of the cursor in the grid.
- **Ctrl + X:** Cut the selected text active field from the grid to the System clipboard.
- **Ctrl + F:** Show the search text window for the *Data view.*
- **F5:** Refresh the view of the grid.
- **Ctrl + home:** Go to the first record.
- **Ctrl + end:** Go to the last record.
- **Ctrl + H:** Link directly to the present document.

Shortcuts in *Menu configuration:*

- **Up arrow:** Select previous object.
- **Down arrow:** Select next object.
- **Ctrl + Home:** Select the first object.
- **Ctrl + End:** Select the last object.
- **Tab:** Select next attribute.
- **Tab + Shift:** Select previous attribute.
- **Esc:** Deselect the selected object.

Shorcuts in *asserted database*:

- **Alt + F4:** Close the window.
- **F5:** Refresh the asserted database panel.
- **C:** Remove the current selection of the rows.

Shortcuts in *database panel*:

- **Supr:** Deletes a selected view o table.
- **Ctrl + C:** Copies the selected node and its content if available.
- **Ctrl + V:** Paste the seleceted node and its content if available.

13.3. ACCESSIBILITY SHORTCUTS IN FRENCH

Shortcuts in *File menu:*

- **Ctrl + N:** Create new file.
- **Ctrl + O:** Open a file.
- **Ctrl + S:** Save active file in the file editor.
- **Ctrl + Shift + S:** Save all files in the file editor.
- **Ctrl + P :** Print active file in the file editor.
- **Alt + X:** Close the application.

Shortcuts in *Edit menu:*

- **Ctrl + Z:** Undo the last action.
- **Ctrl + Y:** Redo the last change.
- **Ctrl + C:** Copy the selected text to the System clipboard.
- **Ctrl + X:** Cut the selected text to the System clipboard.
- **Ctrl + V:** Paste the test in the System clipboard.
- **Ctrl + E:** Select all the text in the active file of the file editor.
- **Ctrl + F:** Open the search window.
- **Ctrl + R:** Open the replace window.
- **Ctrl + U:** Transforms to uppercase a given text.
- **Ctrl + L:** Transforms to lowercase a given text.
- **Ctrl + Shift + U:** Capitalize every word in a given text.
- **Ctrl + Shift + L:** Alternates between uppercase and lowercase every word in a given text.
- **F9:** Send file content to Console.

Shortcuts in *Project menu:*

- **Alt + Shift + N:** Create a new project.
- **Alt + Shift + O:** Open a project.
- **Alt + Shift + S:** Save the opened project.
- **Alt + Shift + A:** Add a file to the opened project.

- **Alt + C:** Compile the opened project.
- **Alt + E:** Execute the opened project.

Shortcuts in *View menu:*

- **Alt + Shift + L:** Show the log tab.

Shortcuts in Configuration menu:

- **Ctrl + Shift + L:** Documents lexicon.
- **Ctrl + Shift + X:** Modifiy the lexicon.
- **Ctrl + Shift + T:** Create a new grammar.
- **Ctrl + Shift + A:** Active line wrapping.
- **Ctrl + Shift + F:** Open the search in console window.

Shortcuts in *Help menu:*

- **Ctrl + H:** Show this document.

Shortcuts in *Data view:*

- **Up arrow:** Go to previous record.
- **Down arrow:** Go to next record.
- **Tab:** Go to next field.
- **Shift + Tab:** Go to previous field.
- **Alt + F4:** Close the *Data view* window.
- **Ctrl + Z:** Undo the updates in the grid.
- **Ctrl + Y:** Redo the last undo in the grid.
- **Ctrl + C:** Copy the selected data from the grid to the System clipboard.
- **Ctrl + V:** Paste the data stored in the System clipboard in the current position of the cursor in the grid.
- **Ctrl + X:** Cut the selected text active field from the grid to the System clipboard.
- **Ctrl + F:** Show the search text window for the *Data view.*
- **F5:** Refresh the view of the grid.
- **Ctrl + home:** Go to the first record.

- **Ctrl + end:** Go to the last record.
- **Ctrl + H:** Link directly to the present document.

Shortcuts in *Menu configuration:*

- **Up arrow:** Select previous object.
- **Down arrow:** Select next object.
- **Ctrl + Home:** Select the first object.
- **Ctrl + End:** Select the last object.
- **Tab:** Select next attribute.
- **Tab + Shift:** Select previous attribute.
- **Esc:** Deselect the selected object.

Shorcuts in *asserted database*:

- **Alt + F4:** Close the window.
- **F5:** Refresh the asserted database panel.
- **C:** Remove the current selection of the rows.

Shortcuts in *database panel*:

- **Supr:** Deletes a selected view o table.
- **Ctrl + C:** Copies the selected node and its content if available.
- **Ctrl + V:** Paste the seleceted node and its content if available.

14.ACIDE VARIABLES

The application supports some variables in the *Console Panel, External Applications Tool Bar* and the console loaded in the *console panel* such as:

- **$activeFile$:** reference the current active file in the file editor panel.
- **$activeFileName$:** reference just the current active name file in the file editor panel.
- **$activeFilePath$:** reference just the current active path file in the file editor panel without including neither file name nor file extension.
- **$activeFileExt$:** reference just the current active extension file in the file editor panel.
- **$mainFile$:** reference the file in the file editor panel that has been marked as *MAIN* file.
- **$mainFilePath$:** reference the just file path in the file editor panel that has been marked has *MAIN* file without including neither file name nor file extension.
- **$mainFileExt$:** reference just the file extension in the file editor panel that has been marked as *MAIN* file.

15.ACIDE DEFAULT COMMANDS

As explained in *Chapter 3.5.10*, with the menu configuration the user can assign to the application the actions that will be executed when menu items are pressed down. All these commands start with *"$"*. The commands assigned by default to *ACIDE – A Configurable IDE* menu items are:

- *File menu:*
  - **$NEW_FILE:** Create a new file in the file editor.
  - **$OPEN_FILE:** Open a file in the file editor.
  - **$OPEN_ALL_FILES:** Open all the files of the active project.
  - **$CLOSE_FILE:** Close the active file in the file editor.
  - **$CLOSE_ALL_FILES:** Close all files in the file editor.
  - **$SAVE_FILE:** Save the active file.
  - **$SAVE_FILE_AS:** Save the active file in a different path.
  - **$SAVE_ALL_FILES:** Save all the opened files in the file editor.
  - **$PRINT_FILE:** Print the active file in the file editor.
  - **$EXIT_FILE:** Close the application.
- *Edit menu:*
  - **$UNDO:** Undo the last action.
  - **$REDO:** Redo the last undone action.
  - **$COPY:** Copy the selected text to the System clipboard.
  - **$PASTE:** Paste the text in the System clipboard.
  - **$CUT:** Cut the selected text to the System clipboard.
  - **$TOGGLE_COMMENT:** Comment or uncomment the line according to whether the line is commented or not.
  - **$MAKE_COMMENT:** Comment a line.
  - **$RELEASE_COMMENT:** Uncomment a line.
  - **$SELECT_ALL:** Select all the text in the active file of the file editor.
  - **$GO_TO_LINE:** Open a window where user can type down the number of line where he or she wants to go.
  - **$UPPER_CASE:** Transform lower case text into upper case.
  - **$LOWER_CASE:** Transform upper case text into lower case.

  - **$CAPITALIZE:** Transform to upper case the first letter of all the words in a text.
  - **$INVERT_CASE:** Transform to upper case the lower case letters and viceversa.
  - **$SEARCH:** Open the search window.
  - **$REPLACE:** Open the replace window.
- *Project menu:*
  - **$NEW_PROJECT:** Create a new project.
  - **$OPEN_PROJECT:** Open a project in the application.
  - **$CLOSE_PROJECT:** Close the opened project in the application.
  - **$SAVE_PROJECT:** Save the active project in the application.
  - **$SAVE_PROJECT_AS:** Save the active project in the application with a different path.
  - **$ADD_OPENED_FILES:** Add all opened files in the application to the active project.
  - **$NEW_PROJECT_FILE:** Create a new file and adds it to the active project.
  - **$ADD_FILE:** Add the active file in the file editor to current project.
  - **$REMOVE_FILE:** Remove the active file in the file editor from the current project.
  - **$DELETE_FILE:** Delete the active file from the current project and from disk.
  - **$ADD_FOLDER:** Add a folder to the current project.
  - **$REMOVE_FOLDER:** Remove the selected folder from the current project.
  - **$COMPILE:** Compile the current project.
  - **$EXECUTE:** Execute the current project.
  - **$SET_COMPILABLE_FILE:** Set compilable the selected file.
  - **$UNSET_COMPILABLE_FILE:** Unset compilable the selected file.
  - **$SET_MAIN_FILE:** Set as main file the selected file.
  - **$UNSET_MAIN_FILE:** Unset as main file the selected file.
- *View menu:*
  - **$SHOW_LOG_TAB:** Show the log tab.

- **$SHOW_EXPLORER_PANEL:** Show or hide the explorer panel.
- **$SHOW_CONSOLE_PANEL:** Show or hide the console panel.
- **$SHOW_DATABASE_PANEL:** Show or hide the database panel.
- **$SHOW_GRAPH_PANEL:** Show or hide the graph panel.
- **$SHOW_DEBUG_PANEL:** Show or hide the debug panel.
- **$SHOW_ASSERTED_DATABASE_PANEL:** Open the asserted database panel.

- *Configuration menu:*
  - *Lexicon submenu:*
    - **$NEW_LEXICON:** Open a window where user type down the name for the new lexicon.
    - **$DOCUMENT_LEXICON:** Load the lexicon configuration file in the active file of the file editor.
    - **$MODIFY_LEXICON:** Open the lexicon configuration window.
    - **$DEFAULT_LEXICON:** Show the default lexicon configuration window.
  - *Grammar submenu:*
    - **$NEW_GRAMMAR:** Open the new grammar configuration window.
    - **$LOAD_GRAMMAR:** Load a grammar configuration.
    - **$MODIFY_GRAMMAR:** Display the modify grammar configuration window.
    - **$SAVE_GRAMMAR:** Save the current grammar configuration into a file.
    - **$SAVE_GRAMMAR_AS:** Save the current grammar configuration into a file with a different path.
    - **$SET_PATHS:** Display the set paths window.
  - **$COMPILER:** Display the compiler configuration window.
  - *File editor submenu:*
    - **$PREFERENCES:** Display the preferences window.
    - **$FILE_EDITOR_DISPLAY_OPTIONS:** Display the file editor display configuration window.

- **$AUTOMATIC_INDENT:** Enable or disable the automatic indent in the file editor.
- **$LINE_WRAPPING:** Enable or disable the line wrapping in the file editor.
- **$MAXIMUM_LINES:** Ask to the user for the maximum number of lines to send to the console panel.
- **$SEND_CONSOLE_CONFIRMATION:** Enable or disable the confirmation request when user sends contents to console panel.

- *Console submenu:*
  - **$CONFIGURE_CONSOLE:** Open the console configuration window.
  - **$CONSOLE_DISPLAY_OPTIONS:** Display the console display configuration window.
  - **$CONSOLE_LINE_WRAPPING:** Enable or disable the console line wrapping.
  - **$SAVE_CONSOLE_CONTENT:** Save the console content into a file.
  - **$DOCUMENT_CONSOLE:** Load a lexicon configuration into the console panel.
  - **$SEARCH_CONSOLE:** Open the search in console window.
  - **$CLOSE_CONSOLE:** Close the console.
- *Database panel submenu:*
  - **$DES_PANEL:** Select the *DES* conection in database panel.
  - **$ODBC_PANEL:** Select the *ODBC* conection in database panel.
  - **$SHOW_NAME:** Only the name of table and view nodes are shown in the Database Panel.
  - **$SHOW_NAME_FIELDS**: Name and columns of table and view nodes are shown in the Database Panel.
  - **$SHOW_NAME_FIELDS_TYPES**: Name, columns and the type of each column of table and view nodes are shown in the Database Panel.
- *PDG submenu:*

- **$NODES_COLOR:** Display a color selection menu to change the color of the nodes.
- **$NODES_SIZE:** Display a menu to change the size of the nodes.
- **$NODES_SHAPE_CIRCLE**: Change the shape of the nodes to a circle.
- **$NODES_SHAPE_SQUARE**: Change the shape of the nodes to a square.
- **$ARROW_SHAPE_LINE:** Change the sahpe of the tip of the arrow to lines.
- **$ARROW_SHAPE_POLYGON:** Change the shape of the tip of the arrow to a triangle.
- **$ARROW_COLOR_DIRECT:** Display a color selection menu to change the color of the positive depencences arrows.
- **$ARROW_COLOR_INVERSE:** Display a color selection menu to change the color of the negative depencences arrows.
- **$SHOW_LABELS:** show or hide the labels of the nodes.

o *Menu submenu:*

- **$NEW_MENU:** Display the new menu configuration window.
- **$LOAD_MENU:** Load a menu configuration and applies it to application.
- **$MODIFY_MENU:** Display the menu configuration window for modifying.
- **$SAVE_MENU:** Save the current menu configuration.
- **$SAVE_MENU_AS:** Save the current menu configuration with a different path.

o *Tool bar submenu:*

- **$NEW_TOOLBAR:** Display the new toolbar configuration window.
- **$LOAD_TOOLBAR:** Load a tool bar configuration and applies it to application.
- **$MODIFY_TOOLBAR:** Display the tool bar configuration window for modifying.

- **$SAVE_TOOLBAR:** Save the current tool bar configuration.
- **$SAVE_TOOLBAR_AS:** Save the current tool bar configuration with a different path.

- *Help menu:*
  - **$SHOW_HELP:** Open this document.
  - **$SHOW_ABOUT_US:** Display the *About Us* window.

These commands can be assigned to other menu items than are not the default menu items.

16. CONFIGURATION OF ACIDE BY CONFIGURATION DOCUMENTS

16.1. MANAGERS IN XML FILES

Frequently in *XML* configuration files we found labels of the form *"...Manager"*. These labels contain a type of object called *Manager* that is responsible for handling lists of different types of objects. Inside the labels of a *Manager* there is another label called *"_list"* and that in turn holds another label also called *"_list"*. It is inside this label where user introduces the labels of the objects that make up the list he wants to handle with the *Manager* (could be a list of *String, AcideLexiconTokenGroup,* etc.).

There are java classes for each of the *Managers* in *XML* files, which provide methods to manipulate the lists as adding, removing or getting items from them. *Manager Java classes* have an *ObjectList* type field, which in turn has an *ArrayList* field (where user stores the list of objects) and methods for manipulating that list.

To introduce, delete, reorder, etc. elements of the list, just manually edit the *XML* document and operate on the labels of each object.

16.2. PROPERTIES CONFIGURATION

To configure several properties of *ACIDE – A Configurable IDE* there is a file called **configuration.properties** stored in *./configuration*. In this file are stored properties that are not specified in other files. The structure of this file is fixed; user can only edit the values for each field, but he is not able to add new properties or delete any of the existing.

The first line of the properties configuration file is:

```
#ACIDE Configuration
```

The following line shows the date of the last time the user ran this issue of *ACIDE – A Configurable IDE*. Displays the following format:

```
#Mon May 27 18:16:32 CEST 2013
```

The following lines show the property name followed by a *"="* and the value assigned to that property with the following structure:

- **consolePanel.fontName**=name of the font of console panel.
- **workbenchConfiguration**=path to *XML* file that configures the workbench (*Chapter 16.3*)
- **lastOpenedFileDirectory**=the folder was last opened. Used to locate the user in the same folder next time.
- **javacPath**=path of *javac.exe*.
- **jarPath**=path of *jar.exe.*
- **consolePanel.exitCommand**=exit command for console.
- **ed**=
- **consolePanel.fontStyle**=style of the font of console panel.
- **consolePanel.bufferSize**=size of buffer of console panel.
- **previousMenuNewConfiguration**=path to *XML* file that previously configured *ACIDE – A Configurable IDE* menu with the new configuration of version 0.11 (*Chapter 16.3.1*)
- **consolePanel.backgroundColor=**console panel background color (numeric valor).
- **currentMenuConfiguration**=path to *.menuConfig* file that was configurating *ACIDE – A Configurable IDE* menu with the configuration of older versions.
- **databasePanelMenuConfiguration.showDetails**=Name
- **consolePanel.consoleDirectory**=path to the folder where the *.exe* of console console is stored.
- **console Panel.consolePath**=path to the *.exe* file of the console.
- **consolePanel.fontSize**=size of the font of console.
- **previousToolbarConfiguration**=path to *.toolbarConfig* file that previously configured *ACIDE – A Configurable IDE* toolbar (*Chapter 16.3.2*).
- **currentMenuNewConfiguration**= path to *XML* file that configures *ACIDE – A Configurable IDE* menu with the new configuration of version 0.11 (*Chapter 16.3.1*).

- **consolePanel.isechoCommand**=true or false to define the behaviour of echo command at console panel.
- **language**=can be English or Spanish.
- **currentToolbarConfiguration**=path to *.toolbarConfig* file that configures *ACIDE – A Configurable IDE* toolbar (*Chapter 16.3.2*)
- **previousMenConfiguration=**path to *.menuConfig* file that previously configured *ACIDE – A Configurable IDE* menu with the configuration of older versions.
- **lastOpenedProjectDirectory**=the folder of project was last opened. Used to locate the user in the same folder the next time he displays a load or save project dialog.
- **javaPath**=path of *java.exe.*
- **projectConfiguration=**path to the *.acideProject* file used to configure opened project (explained in *Chapter 16.4)*.
- **consolePanel.foregroundColor**=foreground color for console panel (numeric valor).
- **consolePanel.parameters**=parameters that *console panel* needs.

16.3. WORKBENCH CONFIGURATION

The workbench is all the space where user works with files. It contains the *Menu Bar*, the *Tool Bar*, the *Explorer Panel*, the *File Editor*, the *Console Panel* and the *Database Panel*.

The *XML* file that configures the workbench must be saved in the path *./configuration/workbench.*

The root label of this file is:

```
<acide.configuration.workbench.AcideWorkbenchConfiguration>
```

to reference the Java class *AcideWorkBenchConfiguration*.

Inside this root label there are six basic labels:

- **<_workbenchLoaded>:** with true value identifies if the configuration *XML* file has been loaded.

- **<fileEditorConfiguration>:** inside this label there are others nested labels with the configuration of the file editor (explained in *Chapter 16.3.3)*.
- **<_consolePanelConfiguration>:** inside this label there are others nested labels with the configuration of the console panel (explained in *Chapter 16.3.4*.
- **<_lexiconAssignerConfiguration>:** inside this label there are others nested labels with the configuration of lexicons for different extensions and lexicon applied to console (*lexiconAssignerConfiguration* explained in *Chapter 16.3.5)*.
- **<_recentFilesConfiguration>:** inside this label there is a list (inside a *_list* label) of *Strings* with the paths of files opened recently.
- **<_recentProjectsConfiguration>:** inside this label there is a list (inside a *_list* label) of *Strings* with the paths of projects opened recently.

16.3.1. MENU CONFIGURATION

The *Menu Bar* is the element situated at the top of *Workbench*. It contains as default the submenus *File, Edit, Project, View, Configuration* and *Help.* The *Menu Bar* provides user to do the most of actions that are provided in *ACIDE – A Configurable IDE.*

The root label of this file is:

```
<acide.configuration.menu.AcideMenuItemsConfiguration>
```

to reference the Java class *AcideMenuItemsConfiguration.*

Inside this label there is only one basic label, *_itemsManager*. This label has two nested *_list* labels. Inside of the most nested there are the *acide.configuration.menu.AcideMenuSubmenuConfiguration* objects that define the basic menus that exit on *Menu Bar.* They have the following nested labels:

- **<_name>:** the name of the submenu.
- **<_visible>:** with true or false value. It sets if submenu is visible or not.
- **<_erasable>:** with true or false value. It sets if submenu is erasable or not erasable (it is a default submenu).
- **<_image>:** for submenus this label is empty.

- **<_itemsManager>:** it is equal to root *_itemsManager* label. It contains all the menu objects that are inside the submenu.

For the menu items the label is *AcideMenuItemConfiguration.* They have the following nested label:

- **<_name>:** the name of the item.
- **<_visible>:** with true or false value. It sets if item is visible or not.
- **<_erasable>:** with true or false value. It sets if item is erasable or not erasable (it is a default item).
- **<_image>:** the path of its image icon.
- **<_command>:** the command will be run when user click on this menu item.
- **<_parameter>:** the type of parameter that command needs to run. It can be *NONE, TEXT, FILE,* or *DIRECTORY.*

User can insert, delete, reorder, etc. *AcideMenuObjectConfiguration* labels (*AcideMenuSubmenuConfiguration* and *AcideMenuItemConfiguration* both are subclasses of *AcideMenuObjectConfiguration)* inside the root label to manage the configuration of the *Menu Bar.*

16.3.2. TOOLBAR CONFIGURATION

The *Tool Bar* is situated below the *Menu Bar*. In the *Tool Bar* appear several buttons for typical actions with files and projects. It also contains buttons that user configures to send commands to console and to launch external applications.

Toolbar configuration is done in *.toolbarConfig* files. These files are divided in two parts, one part that stores settings of buttons for the toolbar that paste code on the console to be run, and other part for configuration of buttons to launch external applications.

To configure buttons to send commands to the console, each configuration of a button should be headed by a comment line (starting with //) and consists of six lines with the following structure:

- **name** = name displayed.
- **action** = command to run on the console.

- **hintText** = help text displayed when user puts mouse over the button.
- **icon** = path of the image for the button.
- **parameterType** = type of the parameter that the command uses on console. It can be:
  - **NONE**
  - **TEXT**
  - **FILE**
  - **DIRECTORY**
- **isExecutedInSystemConsole** = if is executed in the system or not.

Once the list of command buttons is ended, user has to enter the following line in the file, in order to indicate that the following settings are for buttons that launch external applications:

```
//End of Console Panel Tool Bar Button Configuration
```

Configurations of buttons that launch applications must be headed by a comment line (starting with //) followed by four lines of properties:

- **name** = name displayed.
- **path** = path to run.
- **hintText** = help text displayed when user puts the mouse over the button.
- **icon** = path of the image for the button.

Once the list of command buttons is ended, user has to enter the following line in the file, in order to indicate that configuration of buttons that launch external applications is ended:

```
//End of External Applications Tool Bar Button Configuration
```

16.3.3. FILE EDITOR CONFIGURATION

The *File Editor* is where user can edit the content of the files. It contains a tab pane where the opened files are displayed.

The *File Editor* is configured by a label in the *XML* file that configures the *Workbench* (explained on *Chapter 16.3)*. Inside this label the user can find the information needed to configure *File Editor*. The labels are:

- **_fileEditorConfigurationList**: acts like a *Manager* (explained on *Chapter 16.1)* including two nested *_list* labels with *AcideFileEditorPanelConfiguration* objects. These objects store information about files which must be shown opened at *File Editor* next time the application will be opened.
- **_selectedFileEditorPanelName**: the name of the file which is shown at the *File Editor*.
- **_fontName**: the font name of the text of *File Editor*.
- **_fontStyle:** font style of the text of *File Editor.*
- **_fontSize:** font size of the text of *File Editor*.
- **_foregroundColor, backgroundColor:** RGB components of font color and background color.
- **_editionMode:** with false value, edition mode is *INSERT*, with true value it is *OVERWRITE.*
- **_automaticIndent:** with true value, automatic indent, with false value, manual indent.
- **_maximumLinesToConsole:** the maximum number of lines that can be sent to the console at the same time.
- **_lineWrapping:** with true value, sets on line wrapping, with false value, sets off line wrapping.
- **_sendToConsoleConfirmation:** with true value, system needs confirmation to send content of file to console. With false value, file content is sent without confirmation.

16.3.4. CONSOLE PANEL CONFIGURATION

At *Console Panel* content of console connected with the application is displayed.

It has two labels:

- **_lexiconConfiguration:** path of lexicon which is used at console.
- **_commandsConfiguration:** path of *XML* file that contains commands history with which we want to start the console (explained in *Chapter 16.6).*

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16.3.5. LEXICONASSIGNER CONFIGURATION

It has three basic labels:

- **_list:** acts like a *Manager*, inside there is a *_list* label with another *_list* label nested. It is a list of *AcideLexiconAssigner* objects. These objects describe possible lexicons to use at console. They have the following nested labels:
  - **_description:** name of lexicon.
  - **_extensionList:** it has a group of nested String labels with the possible extensions for the lexicons.
  - **_lexiconConfiguration:** path of *XML* file that configures lexicon.
- **_consoleLexiconConfiguration:** path of *XML* file that configures lexicon which is currently in use.
- **_applyLexiconToConsole:** with true value lexicon is applied to console, with false value it is not applied.

16.4. PROJECT CONFIGURATION

Project configuration is edited in *.acideProject* files. In this type of files are arranged in separate lines different project properties. These are, line by line, the following:

1. Project Name
2. Project Path
3. Compiler Path
4. Compiler Arguments
5. Compiler All Files
6. File separator
7. File extensión
8. Executable path
9. Executable arguments
10. Console panel Console path
11. Console panel Console directory
12. Console panel exit command
13. Console panel is echo command
14. Console panel parameters
15. Console panel foreground color
16. Console panel background color
17. Console panel Font name
18. Console panel Font style
19. Console panel Font size
20. Console panel buffer size
21. Is explorer panel showed flag
22. Is console panel showed flag
23. Is database panel showed flag
24. Is graph panel showed flag
25. Is debug panel showed flag
26. ACIDE - A Configurable IDE main window width
27. ACIDE - A Configurable IDE main window height
28. ACIDE - A Configurable IDE main window x coordinate
29. ACIDE - A Configurable IDE main window y coordinate
30. ACIDE - A Configurable IDE main window vertical upper left split
31. ACIDE - A Configurable IDE main window vertical lower left split
32. ACIDE - A Configurable IDE main window vertical right split
33. ACIDE - A Configurable IDE main window horizontal left split
34. ACIDE - A Configurable IDE main window horizontal right split
35. Language configuration
36. Database panel configuration
37. Menu configuration
38. Menu new configuration
39. Tool bar configuration
40. Panel contained in the upper left part of the window
41. Panel contained in the lower down part of the window
42. Panel contained in the upper part of the window
43. Panel contained in the lower part of the window
44. Panel contained in the upper right part of the window
45. Panel contained in the lower right part of the window
46. Number of files of the project

The following lines show the properties of the project files. For each file there are seven lines of text storing the file properties. Therefore, there will be many groups of seven lines in the configuration file as indicated at line number 34. The properties are as follows:

- Absolute path.
- Name.
- Parent.
- Directory flag.
- Compilable flag.
- Main flag.
- Opened flag.

16.5. CONFIGURATION OF LEXICONS

Lexicons can be configured by manually editing *XML* files that define them.

A *XML* file that defines a lexicon begins with the root label:

```
<acide.configuration.lexicon.AcideLexiconConfiguration>
```

to reference the class *AcideLexiconConfiguration.* Inside this root label there are seven basic tags:

- **_name:** defines the name of the lexicon.
- **_path:** indicates the relative path of this file.
- **_isCompiledOrInterpreted:** a false value indicates that the lexicon is compiled and true indicates that it is interpreted.
- **_tokenTypeManager:** it is a *Manager* (explained on *Chapter 16.1)* of the types of token there are in the lexicon. It consists of a list of objects *AcideLexiconTokenGroup.*
- **_validExtensionsManager:** it is a *Manager* of valid extensions of files at the lexicon defined in the *XML* document. The extensions are *String* objects.
- **_delimitersManager:** it is a *Manager* of valid delimiters at the lexicon defined in the *XML* document. The delimiters are *String* objects.

- **_remarksManager:** it is not a common *Manager.* It defines the symbol to mark a line as a comment in the lexicon. It has four nested labels:
    - **_symbol:** defines the symbol to use to begin a comment line.
    - **_isCaseSensitive:** defines (true or false value) if it is case sensitive.
    - **_color:** defines color of the comments. It has four nested tags (*red, blue, green, alpha*) that define the RGB components and the degree of opacity of the comments.
    - **_fontStyle:** defines the font style of comments.

16.5.1. TOKENTYPE MANAGER

This label has two nested *_list* labels. Inside of the most nested there are the *AcideLexiconTokenGroup* objects that define the token types in the lexicon. The *AcideLexiconTokenGroup* objects have five nested labels:

- **_name:** it is a summary of the properties defined by the remaining labels. It has the following form:
    - Color: [R: _, G: _, B: _], Font Style: __, Case Sensitive: _
    - For color will take the values defines in the label *_color*. In Font Style appears the name that corresponds to the number defined on the label *_fontStyle.* In Case Sensitive value yes appears if the label -*_IsCaseSensitive* is true and value not if the label *_IsCaseSensitive* has value false.
- **_color:** same structure as explained for *_color* label above.
- **_fontStyle:** it defines with a number the font style.
- **_isCaseSensitive:** it defines by true or false value if it is case sensitive.
- **_tokenList:** contains a label called *_list* where appears the list of *String* objects which define the tokens with the properties user has described for this token group. Adding, removing and editing these strings the user will get the list of tokens.

16.5.2. VALIDEXTENSION MANAGER

As a *Manager*, it has two nested *_list* labels. Inside the last the user can find String objects labels where he can define extensions valid for the lexicon.

16.5.3. DELIMITERS MANAGER

It is a *Manager* whose list contains String objects. With the strings the user defines the valid delimiters for the lexicon.

16.6. COMMANDS HISTORY

In *ACIDE – A Configurable IDE* is possible to configure a commands history so that when user starts the application already exits this history, similar to when he gets commands entered earlier in the same run.

The *XML* file that contains the commands history must be saved in the path *./configuration/console.*

The root label of this file is:

```
<acide.configuration.console.AcideConsoleCommandsConfiguration>
```

to reference the AcideConsoleCommandsConfiguration class.

Inside this label user has to define another label of *Manager* type called *_commandsManager.*

As usual at *Managers*, there are two nested *_list*. Inside the last the user defines by String labels the commands he wants to introduce in the commands history. The first command at the list acts like the less recently entered at the console.

17. REGULAR EXPRESSIONS

A regular expression, often called pattern, is an expression that describes a set of strings without listing their elements. Most formalizations provide the following constructors: a regular expression is a way of representing regular languages (finite or infinite) and is constructed using alphabet characters on which the language is defined. Regular expressions provide a flexible way to search or recognize strings.

17.1. CONSTRUCTION OF REGULAR EXPRESSIONS

Specifically, regular expressions are built using the operators union, concatenation and Kleene closure.

- **Alternation**: A vertical bar separates alternatives. For example, "red|brown"joins with red or brown.
- **Quantification**: A quantifier after a character specifies the frequency with which this can occur. The most common quantifiers +, ? and *:
    - **+**: The plus sign indicates that the preceding character must appear at least once. For example, hello+ joins hello, helloo, hellooo, etc.
    - ?: The question mark indicates that the preceding character can appear at most once. For example, S?pain joins Spain and pain.
    - **: The asterisk indicates that the preceding character can appear zero, one, or more times. For example 10** joins 1, 10, 100, 1000, etc.
- **Grouping:** Parentheses may be used to define the scope and precedence of other operators. For example, "(m|h)ouse" is the same as "mouse | house" and "(in)?sensitive" joins with insensitive and sensitive.

Builders can be freely combined within the same expression, so "H (ae? | ä) del" is the same as "H (a |ae | ä) del".

Its most obvious use is to describe a set of strings, which is useful in text editors and applications for searching and manipulating text.

17.2. DESCRIPTION OF REGULAR EXPRESSIONS

17.2.1. THE DOT "."

The dot is interpreted by the search engine as "any character", looking for any character NOT including line breaks.

The dot is used as follows: If we search "g.t" in the string "gat get got goot" the search engine will find "gat" "get" "got". Note that the search engine don't find "goot", this is because the dot represents a single character and only one.

17.2.2. THE BACKSLASH "\"

It is used to "tag" the next character in the search expression so that it acquires a special meaning or stop having him. The backslash is never used by itself, but in combination with other characters. Used for example in combination with the point "\.", this has not its normal meaning and behaves as a literal character.

In the same way, placing a backslash followed by any of the special characters discussed below, these do not have special meaning and become literal search characters.

As mentioned previously, the backslash can also give special meaning to characters that do not. Below is a list of some of these combinations:

- **\t:** represents a tab.
- **\r:** represents the *carriage return* or *return to top*, the place where the line starts again.
- **\n:** represents the *new line* character through which a line begins. Remember that in *Windows* is needed a combination of *\r\n* to start a new line, while *Unix* uses only *\n* and classic *Mac OS* uses only *\r.*
- **\a:** represents a *bell* or *beep* that occurs when you print this character.
- **\e:** represents the *Esc* or *Escape.*
- **\f:** represents a page break.
- **\v:** represents a vertical tab.
- **\x:** is used to represent *ASCII* or *ANSII* code.
- **\u:** is used to represent *UNICODE* characters with its code.

- **\d:** represents a digit from 0 to 9.
- **\w:** represents any alphanumeric character.
- **\s:** represents a blank space.
- **\D:** any character other than a digit from 0 to 9.
- **\W:** represents any non-alphanumeric character.
- **\S:** any character other than a blank.
- **\A:** represents the beginning of the string. Not a character but a position.
- **\Z:** represents the end of the string. Not a character but a position.
- **\b:** marks the beginning and end of a word.
- **\B:** marks position between two alphanumeric or non-alphanumeric characters.

17.2.3. THE BRACKETS "[]"

The function of the brackets in regular expressions is to represent "character class", grouping characters into groups or classes. They are useful when is needed to find one of a group of characters. Within the brackets you can use the "-" to specify ranges of characters. Additionally, the metacharacters lose their meaning and become literal when they are inside the brackets. For example, as mentioned previously, "\d" is useful to find any character that represents a digit. However, this name does not include the "." dividing the decimal part of a number. To search for any character that represents a digit or a point we can use the regular expression "[\d.]". As noted above, within the brackets, the point represents a literal character, not a metacharacter, so it is not necessary to precede the backslash. The only character that must be preceded by the backslash inside the brackets is the backslash.

17.2.4. THE BAR "|"

This character is used to indicate one of several options. For example, the regular expression "a|e" find all "a" or "e" in the text. The regular expression "East|West|North|South" will find any of the names of the cardinal points. The bar is commonly used in conjunction with other special characters.

17.2.5. THE DOLLAR SIGN "$"

This character represents the end of the string or the end of the line when using the multi-line mode. There is not a special character, but a position. Using the regular expression "\.$" the engine will find all the places where a line ends with a dot, which is useful for moving between paragraphs.

17.2.6. THE CARET "^"

This character has a dual function, which differs when used alone and when used in conjunction with other special characters. Firstly its functionality as an individual character: the character "^" represents the beginning of the chain (in the same way that the dollar sign "$" represents the end of the string). Therefore, using the regular expression "^[a-z]" the engine will find all paragraphs beginning with a lowercase letter. When used in conjunction with the brackets, for example with the form "[^\w]", is useful to find any character that is not in the indicated group. The above expression can found any character that is not alphanumeric or a space, all punctuation and other special characters.

17.2.7. PARENTHESES "()"

Similarly to the brackets, parentheses are used to group characters. However, there are several differences between groups established by brackets and groups established by parentheses:

- Special characters keep their meaning within the parentheses.
- Groups established by parentheses make a *label* for the search engine that can be used later as denoted below.
- Used in conjunction with bar "|" enables optional searches. For example, the regular expression "to (East | West | North | South) of" searches texts giving instructions through cardinal points, while the regular expression "East | West | North| South" find "east" in the word "beast", failing to fulfill this purpose.
- Used in conjunction with other special characters listed below provide additional functionality.

17.2.8. THE QUESTION MARK "?"

The question mark has several features in regular expressions. The first is to specify which part of the search is optional. For example, the regular expression "S?pain" can find both "pain" and "Spain". In conjunction with parentheses specifies that a larger set of characters is optional, for example, "Nov(\.|ember|iembre)?" finds both "Nov.", "November" and "Noviembre". Similarly, you can use the question mark with another meaning. Parentheses define groups "anonymous", but the question mark in conjunction with triangular brackets "<>" give name to such groups as follows: "^(?<Day>\d\d)/(?<Month>\d\d)/(?<Year>\d\d\d\d)$" Whereupon it specifies to the search engine that the first two digits found will be labeled "Day", the second will be labeled "Month" and the last four digits will be labeled "Year".

17.2.9. THE BRACES "{}"

Usually the braces are literal characters which are used separately in a regular expression. To be used as metacharacters they have to enclose one or more numbers separated by commas and to be placed to the right of another regular expression as follows: "\d{2}". This expression will find two adjacent digits. Using this formula, the example "^\d\d/\d\d/\d\d\d\d$" that served to validate a date format will become to "^\d{2}/\d{2}/\d{4}$" for clarity in reading the expression.

17.2.10. THE ASTERISK "*"

The asterisk is used to find something that is repeated 0 or more times. For example, using the expression "[a-zA-Z]\d*" will be possible to find both "H" and "H1", "H01", "H100" and "H1000", a letter followed by a indefinite number of digits.

17.2.11. THE PLUS SIGN "+"

It is used to find a string that is repeated one or more times. The expression "[a-zA-Z]\d+" will find "H1" but will not find "H".